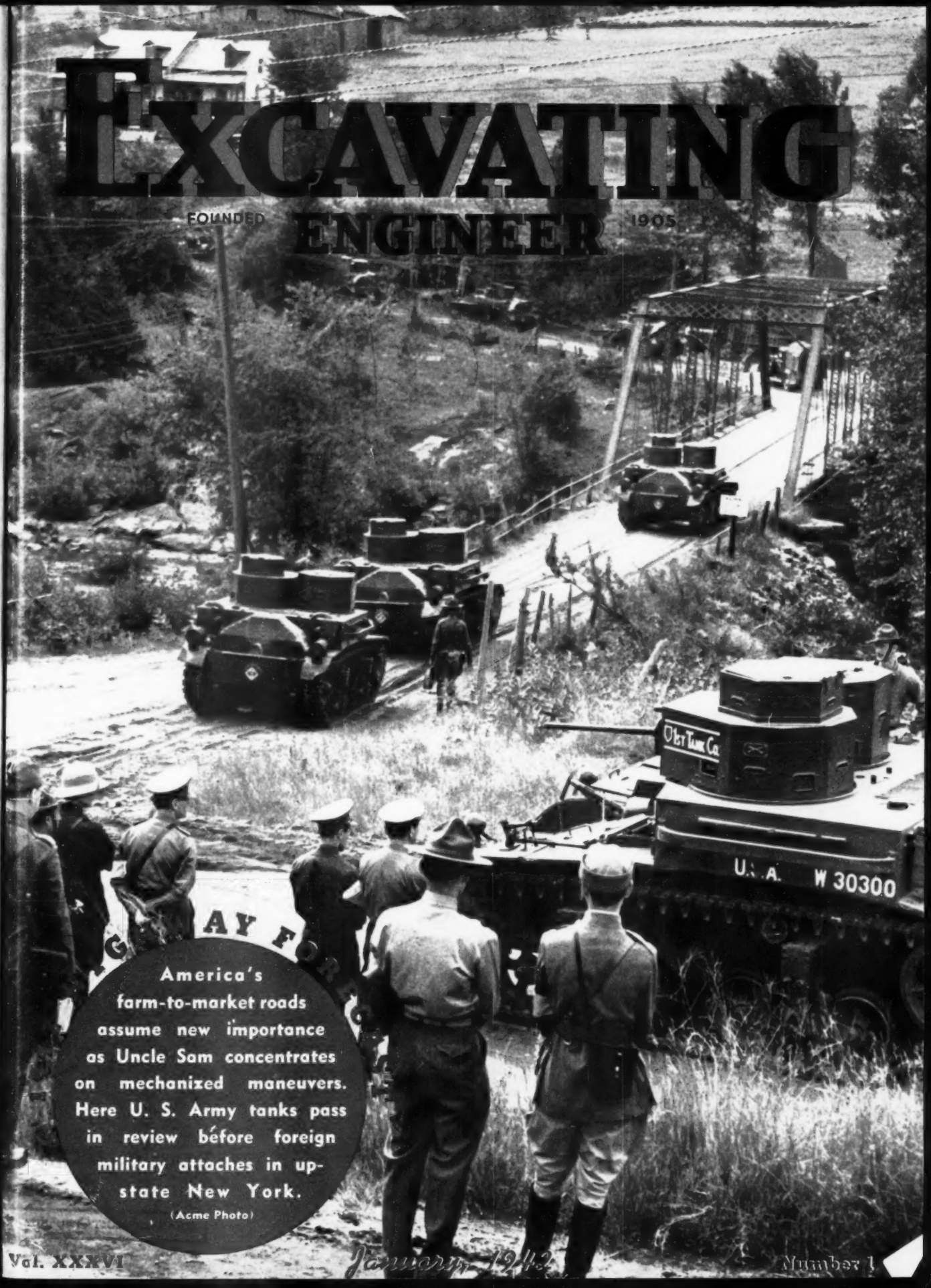
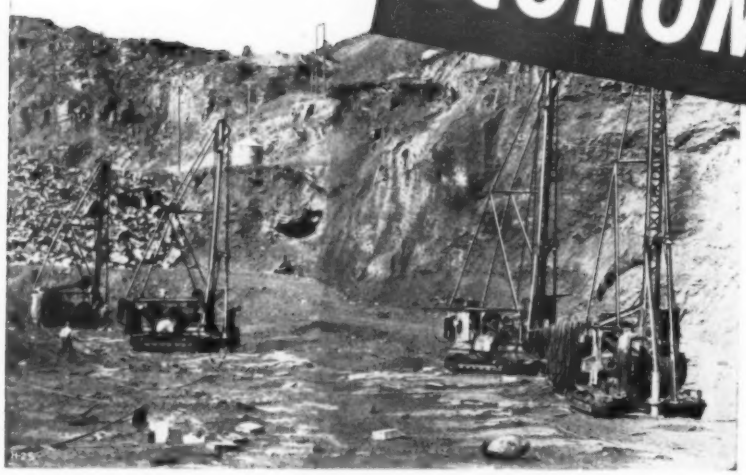


America's farm-to-market roads assume new importance as Uncle Sam concentrates on mechanized maneuvers. Here U. S. Army tanks pass in review before foreign military attaches in up-state New York.

(Acme Photo)

Vol. XXXVI January 1942 Number 1

SAFETY *first* . . . ECONOMY *always*



with

BUCYRUS ERIE

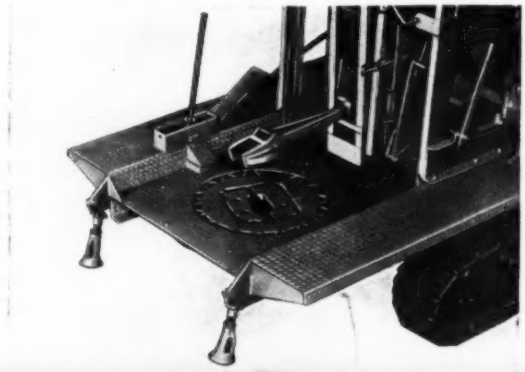
MODERN BLAST HOLE DRILLS

Operators "take to" the new large platform and built-in tool wrench found on modern Bucyrus-Erie blast hole drills. And well they should, for every thought for safety as well as efficiency was considered when Bucyrus-Erie engineers, with 75 years of successful drill designing to their credit, planned this new feature.

They built a large platform, big enough to allow ample room for a couple of pairs of husky shoes to keep out of the way of the bone-crushing weight of heavy tools. Pressed non-skid steel was used for the floor to give *better footing* than any pair of hob nailed boots—And the men work up off the wet ground and out of the muck.

Not only does this important improvement in blast hole drills make drilling safer, but it also makes it faster. The mechanical built-in tool wrench breaks tool joints quickly and eliminates all the back breaking labor and delay involved in handling heavy tool wrenches. This new turning wrench, driven by a bevel-gear drive beneath the operator's platform, is operated by means of an easily worked hand-lever ratchet on the operator's platform (by power on the 42-T). A holding wrench is hinged within the derrick-foot so it can be quickly and easily swung down for use. A common nail serves as a shear pin—when this snaps the joint is tight enough; thus, accurate setting of tool joints is assured.

Built-in tool wrenches are now available on the complete line of Bucyrus-Erie blast hole drilling equipment —the 27-T, 29-T, and 42-T. See for yourself how you can speed up your work, keep sharper tools on your rigs, and help satisfied operators to get the maximum output from modern Bucyrus-Erie drills. Investigate your drilling costs NOW. You'll find modern Bucyrus-Erie drills can save you money.



Bucyrus-Erie

SOUTH MILWAUKEE, WISCONSIN

EXCAVATING ENGINEER

FOUNDED 1905

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supple as a greyhound

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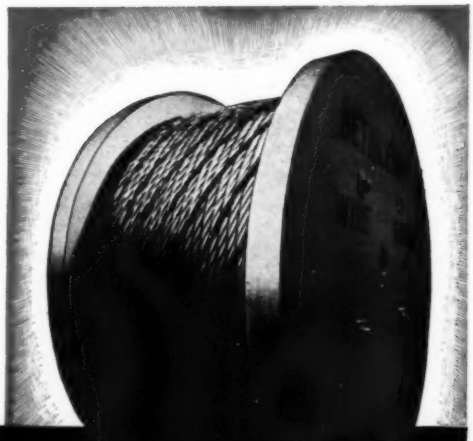
PURPLE STRAND
FORM-SET
WIRE ROPE



BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

For your convenience in writing to Bethlehem Steel Co., you will find a card bound in this issue.

1942 Highway Forecast

FAST BREAKING current events make the job of accurately forecasting Uncle Sam's 1942 highway program a little difficult without a good, reliable crystal ball. However, the state-by-state forecasts on the following pages do give some indication of the amount of money available for road construction in the coming year.

Most states have adequate funds that under normal circumstances would mean a definite increase in highway maintenance, improvement and new construction volume. But these are not normal times. Japan's treacherous Pearl Harbor attack, although costly, has united this nation in a determined and powerful war effort.

In the days of war to come, construction of military access roads and the constant improvement of the strategic military network of highways will be the paramount job of the nation's roadbuilders. Federal authorities have already requested that state-assigned Federal secondary highway funds be limited to work on the nation's military network of roads. All secondary, Federal-aid projects that have not been placed under contract, must be suspended for the duration of the war, and the funds originally allocated to these secondary projects must now be placed on the strategic military network.

The government has indicated that the state's own funds should be spent either on the strategic military network, or on road work that will not require critical military materials or the purchase of heavy construction equipment, since priorities will not be available for this type of road work. All-out war measures will, of course, limit the materials, equipment and men available for any but the most important of road construction projects.

In addition to their road-building duties, the men in the excavating industry are being called upon to continue their important part in the government's all-out army and navy construction program which will be carried on with increased vigor during the coming year. Certain civilian activities such as vital general construction, dredging, levee work and rivers and harbors improvements are all also on the list for secondary activity in 1942.

In their response to our request for 1942 highway plans many states indicated that they have already planned certain war time activities to keep their highway departments busy. Job No. 1 in all of these plans, of course, is the immediate construction and improvement of all strategic roads. Next in line are the many farm-to-market roads that can be improved with a minimum of materials. Many of these roads are badly in need of drainage and grading attentions that can be satisfactorily handled with available equipment and materials.

Heading the list of state highway department activities that certainly will be curtailed are the construction of bridges, grade separations, reinforced pavement and installation of metal or reinforced culverts. These structures are all consumers of priority restricted materials and unless they form a part of a strategic road it will hardly be possible to obtain government approval for their construction.

This necessary revamping of our road plans to suit military needs means that many highway projects which are urgently needed all over the country must be postponed for the duration of the war. Currently, there's a bigger job ahead of us which must be done before we turn once again to continuing the progress of our peacetime highway system. In the meantime, we can make the most of this emergency by using available equipment and materials to full advantage whenever possible.

FEDERAL AID HIGHWAY PROJECTS

AS OF OCTOBER 31, 1941

STATE	COMPLETED DURING CURRENT FISCAL YEAR			UNDER CONSTRUCTION			APPROVED FOR CONSTRUCTION			BALANCE OF FUNDS AVAILABLE FOR PROGRAMMED PROJECTS
	Estimated Total Cost	Federal Aid	Miles	Estimated Total Cost	Federal Aid	Miles	Estimated Total Cost	Federal Aid	Miles	
Alabama	$ 2,537,337	$ 1,261,780	92.8	$ 6,038,031	$ 2,996,115	193.3	$ 1,880,004	$ 934,850	49.2	$ 897,957
Arizona	531,710	383,026	33.1	1,825,980	1,226,780	67.8	558,314	372,325	12.2	875,129
Arkansas	2,710,335	1,258,509	49.6	845,756	422,558	29.0	575,078	286,701	37.8	393,967
California	4,980,409	2,639,950	88.0	5,149,495	2,808,374	61.1	3,496,621	1,752,090	61.4	1,725,978
Colorado	2,051,555	1,160,808	122.3	2,150,528	1,247,015	150.6	1,898,858	1,072,095	56.1	1,113,203
Connecticut	711,753	347,250	7.2	1,839,282	898,833	22.8	1,121,015	502,187	14.9	493,167
Delaware	214,010	104,617	4.9	811,153	399,662	21.2	268,040	134,020	8.4	979,278
Florida	772,915	386,458	52.4	1,537,392	794,925	30.5	1,892,110	922,393	16.1	2,236,146
Georgia	2,125,531	1,062,765	62.1	6,566,643	3,293,572	273.6	3,919,851	1,959,926	164.8	4,849,951
Idaho	1,361,855	839,942	72.8	1,168,465	720,832	63.7	604,926	373,507	20.4	942,750
Illinois	2,725,111	1,354,897	71.3	8,198,935	4,099,392	136.3	1,258,998	628,794	6.3	3,310,226
Indiana	2,600,929	1,296,650	39.4	6,951,227	3,233,098	108.3	1,567,842	783,921	20.7	909,495
Iowa	1,875,347	884,343	85.5	5,629,674	2,520,158	183.2	1,218,516	335,300	44.5	28,022
Kansas	3,205,430	1,621,883	161.5	4,777,500	2,392,926	277.2	3,360,461	1,389,584	128.5	2,936,917
Kentucky	2,398,662	1,203,144	93.6	6,920,394	3,296,653	155.1	2,932,980	1,466,490	20.3	70,280
Louisiana	800,645	400,301	22.3	2,030,120	1,006,642	39.7	2,568,556	1,259,086	56.3	3,053,749
Maine	708,657	356,578	20.2	1,893,742	972,831	22.3	270,170	135,085	3.9	364,973
Maryland	1,703,200	851,000	18.9	3,370,162	1,574,678	19.7	1,145,000	242,500	5.9	951,489
Massachusetts	2,253,419	1,129,370	17.3	2,316,145	1,189,383	14.9	1,175,721	584,274	8.4	2,593,405
Michigan	5,902,470	2,936,758	131.7	4,320,270	2,160,135	74.5	2,083,100	1,041,550	19.5	737,564
Minnesota	3,290,769	1,641,307	312.2	9,765,382	4,841,298	410.1	1,363,844	679,537	58.7	729,780
Mississippi	2,802,960	1,400,620	160.1	5,549,952	2,710,986	308.9	659,300	327,900	32.5	661,219
Missouri	3,923,098	1,936,666	141.6	10,254,546	4,659,107	190.1	3,162,480	757,629	44.5	3,045,965
Montana	2,002,944	1,132,347	98.9	2,847,172	1,617,899	136.6	753,264	428,306	66.9	3,080,650
Nebraska	756,448	373,489	109.9	7,319,146	3,694,565	647.0	710,611	355,306	38.5	2,176,430
Nevada	1,774,181	1,543,338	92.2	1,036,310	899,711	34.3	458,057	397,569	9.4	97,664
New Hampshire	292,328	144,253	5.3	1,223,881	585,889	14.3	18,224	7,312		770,981
New Jersey	2,348,574	1,174,287	20.5	3,562,648	1,781,244	22.2	22,270	11,135		1,759,929
New Mexico	943,125	580,478	71.0	1,404,425	868,207	87.2	16,182	10,463	5.0	1,507,962
New York	5,116,556	2,551,583	76.8	10,931,119	5,432,161	123.4	862,200	411,850	8.4	2,466,895
North Carolina	2,392,919	1,180,290	105.9	4,067,552	2,036,635	157.0	577,927	285,555	26.2	1,736,439
North Dakota	2,696,932	1,509,463	238.4	3,068,110	1,587,484	235.4	2,086,670	1,046,705	179.4	2,976,805
Ohio	5,211,504	2,599,677	43.2	14,054,902	6,786,461	114.4	4,064,080	1,691,485	27.3	2,164,705
Oklahoma	1,329,205	650,460	62.8	3,108,341	1,640,449	85.2	2,183,370	1,143,558	72.9	4,056,099
Oregon	1,142,629	689,896	37.6	4,344,409	2,283,840	97.6	449,649	221,190	14.7	371,582
Pennsylvania	3,082,916	1,535,850	41.8	13,941,192	6,869,809	112.1	2,234,696	1,070,884	18.0	1,669,073
Rhode Island	533,402	266,095	5.5	1,280,255	638,753	9.0	28,060	14,030	.3	773,816
South Carolina	891,504	415,437	64.7	3,876,970	1,793,057	96.7	1,594,553	687,327	37.8	1,250,646
South Dakota	1,732,723	1,008,810	224.0	4,565,583	2,892,779	484.1	1,435,890	898,660	171.6	1,369,857
Tennessee	1,583,516	789,774	60.1	5,322,162	2,661,081	96.4	1,821,164	910,582	52.0	2,312,934
Texas	5,393,989	2,645,034	286.0	12,971,773	6,328,224	495.8	5,484,880	2,244,670	182.1	3,776,213
Utah	648,455	484,518	42.1	2,214,987	1,670,431	43.7	75,033	55,188	5.4	251,387
Vermont	333,669	165,120	12.5	1,695,292	843,996	37.0	41,081	20,540	.3	57,640
Virginia	1,243,087	623,172	30.0	5,272,146	2,462,923	94.7	889,310	441,605	7.7	1,076,104
Washington	362,625	194,000	6.0	3,239,392	1,731,404	46.0	539,413	260,085	5.2	764,214
West Virginia	1,278,460	637,233	30.4	3,570,460	1,770,293	44.7	464,766	230,633	6.8	1,230,577
Wisconsin	908,049	446,770	46.8	6,329,197	2,988,288	194.3	1,939,320	731,759	62.8	2,393,602
Wyoming	1,414,675	903,980	148.3	1,148,529	754,151	78.9	737,311	474,086	44.6	239,335
District of Columbia	463,514	231,540	2.5	732,536	343,000	1.0	140,642	70,300	.9	247,214
Hawaii	140,808	70,395	1.1	701,887	518,147	9.5	41,366	21,894	.3	1,694,699
Puerto Rico	176,100	87,085	2.6	1,420,268	701,150	15.4	1,082,599	534,669	5.1	336,513
TOTALS	98,382,944	51,092,996	3,825.7	225,161,428	113,647,984	6,467.8	69,734,283	32,619,081	1,940.9	76,510,535

State-by-State FORECAST

Alabama

State highway officials preface their report on Alabama's proposed 1942 program with the statement that, due to unsettled conditions, their plans are already undergoing revision. Prior to such revision, however, their forecast indicated a total of $17,484,000 available for roads, with $14,784,000 planned for construction, $2,300,000 for maintenance and $400,000 for purchase of equipment.

Included in the planned construction is the completion of 150 miles of bituminous paving started October 1, 1941, plus an additional 500 miles to be completed in 1942. Additional mileage of gravel and graded - and - drained roads was planned, along with a normal bridge building and grade separation program.

During the past several years, Alabama has planned and programmed far in advance of construction, road building and maintenance in order to provide the greatest good to the greatest number with the finances available. As a result of this program, the state was able, during the fiscal year ending September 30, 1941, to complete a construction program which included 409 miles of road graded and drained, 50.32 miles given a temporary surface, 399.23 miles of base course, 436.03 miles of bituminous prime coat, 454.59 miles of bituminous mat, 442.02 miles of bituminous seal coat and 4.7 miles of bridges. The cost of the above work, including other activities, was $8,963,510 for highway construction, $2,572,979 for maintenance and $259,478 for equipment purchases.

Arizona

Up approximately 4% over 1941 figures, Arizona's 1942 highway budget is expected to total $7,452,000 for 1942. Included in this sum is $4,611,000 available for construction, $1,671,000 for maintenance and $1,170,000 to cover all other highway department expenditures.

Sources from which 1942 funds will be made available include regular Federal Aid, $1,435,000; other Federal Aid, $526,000; state gas tax, $3,762,000 and vehicle license fees and other income, $1,729,000.

1942 construction funds will be apportioned to complete a program calling for 200 miles of gravel or crushed stone surfacing, 150 miles of oil treatment, 10 miles of high type paving, 2 miles of low type paving and 6 bridges.

Arkansas

No figures were available on the state's 1942 program at press time, but a check of reports on the status of Federal Aid projects in the state, as of October 31, 1941, showed that 29 miles of Federal Aid highways were under construction at an estimated total cost of $845,756. Additional mileage approved for construction totalled 37.8 and costs for this were estimated at $575,078. Secondary or feeder road projects under construction, costing $235,449, involved 17.4 miles and feeder road projects approved for construction totalled $331,004 for 14.3 miles of road. Also under construction were six grade crossing projects totalling $511,114, with 11 more approved for construction at an estimated total cost of $33,786.

Highway department officials furnished a summary of 1941 construction, amounting to a total of $3,078,000 in contract commitments, and covering the following items:

High type pavement—6 miles.
Bituminous surfacing, road mix or equivalent—101 miles.
Untreated gravel surfacing—32 miles.
Grading and minor drainage structures —25 miles.
Major bridges—5,746 feet.
2—Railroad-highway overpass structures.
2—Railroad-highway underpass structures.
12—Railroad crossing protection devices.

Funds from Federal sources amounted to $2,258,000 of the whole, and those from State sources to $820,000.

In addition to the above, cooperative work with the Work Projects Administration was placed under agreement involving expenditures or commitments in the

• Roads are important necessities to most of Uncle Sam's rolling stock, but when they aren't available these scout cars from Fort Knox, Kentucky, do without them and march right up a stream bed. (Wide World Photo)

amount of about $360,000 on the part of the State. This work generally consisted of grading, drainage structures, untreated gravel surfacing, treated gravel surfacing, base courses and bituminous surfacing.

California

With both costs and plans upset by the unusual conditions of the past few months, California's budget as adopted December 31, 1940, for the fiscal biennium between July 1, 1941, and June 30, 1943 has undergone revision. The California highway commission adopted a new budget on November 10, 1941, providing allocations for construction and improvement totalling $60,320,000, including all work put under way since the beginning of the biennium on July 1, 1941. Included in this total are provisions for $40,937,500 for construction projects and contingencies, $9,437,500 for improvement to state routes in cities, and $9,945,000 for right of way, engineering and joint highway districts.

During 1941, the California Division of Highways expended or placed under way construction and maintenance work in the total sum of $35,858,600. This total includes the sum of $23,631,000 for construction and $12,227,600 for maintenance operations.

Segregation of these amounts to the various phases of State highway work is shown in the following tabulation.

Construction

Construction and Maintenance Contracts	$11,845,900
Day Labor Construction	4,978,900
Day Labor Minor Improvements	210,900
Day Labor Betterments	288,200
Contributions to WPA Work in Los Angeles	335,000
Convict Construction	655,000
Engineering for Defense Projects off the State System	413,000
Engineering	3,315,800
Right of Way	1,588,300
Total Construction	$23,631,000

Maintenance (Day Labor)

General Maintenance	$ 5,123,500
Replacements	3,473,800
Slide Removal	2,942,900
Buildings and Plants	157,400
San Francisco-Oakland Bay Bridges	530,000
Total Maintenance	$12,227,600
Total Construction	23,631,000
Grand Total	$35,858,600

The $11,845,900 allotted to construction and maintenance contracts provided the following types of improvement during 1941.

Type	Miles	Amount
Grade and dual type pavement	7.6	$ 404,400
Grade and Portland cement concrete pavement	17.3	1,359,700
Grade and asphalt concrete pavement	13.6	988,900
Grade and plant mixed surface on cement treated base	16.9	690,400
Grade and plant mixed surface	110.0	1,585,000
Grade and road-mix surface	36.0	375,600
Grade and bituminous surface treatment	16.1	904,400
Grade and oiled gravel surface	7.8	372,600
Oiled earth	10.1	153,500
Armor coat and retread surfacing	15.0	85,900
Seal coat	101.6	151,000
Grading only	10.3	470,400
Weed oiling	668.0	17,000
Bridges and grade separations	(55)	3,876,200
Miscellaneous contracts		410,900
Total		$11,845,900

The following tabulation gives the source of funds from which this $11,845,900 in contracts was financed.

Source	Amount
State Highway Funds	$ 6,476,300
Regular Federal Aid Funds	3,843,100
Federal Aid Secondary Funds	516,000
Federal Aid Grade Crossing Funds	661,100
Bureau of Reclamation Funds	293,600
County Funds to Match Federal Feeder Funds	55,800
	$11,845,900

Colorado

In furnishing the forecast of Colorado's 1942 highway activities, W. M. Williams, director of publicity, states that the tentative budget has been submitted to the governor for approval, but that new developments are anticipated and approval of the budget is expected to be delayed for several months, during which changes in the program may occur.

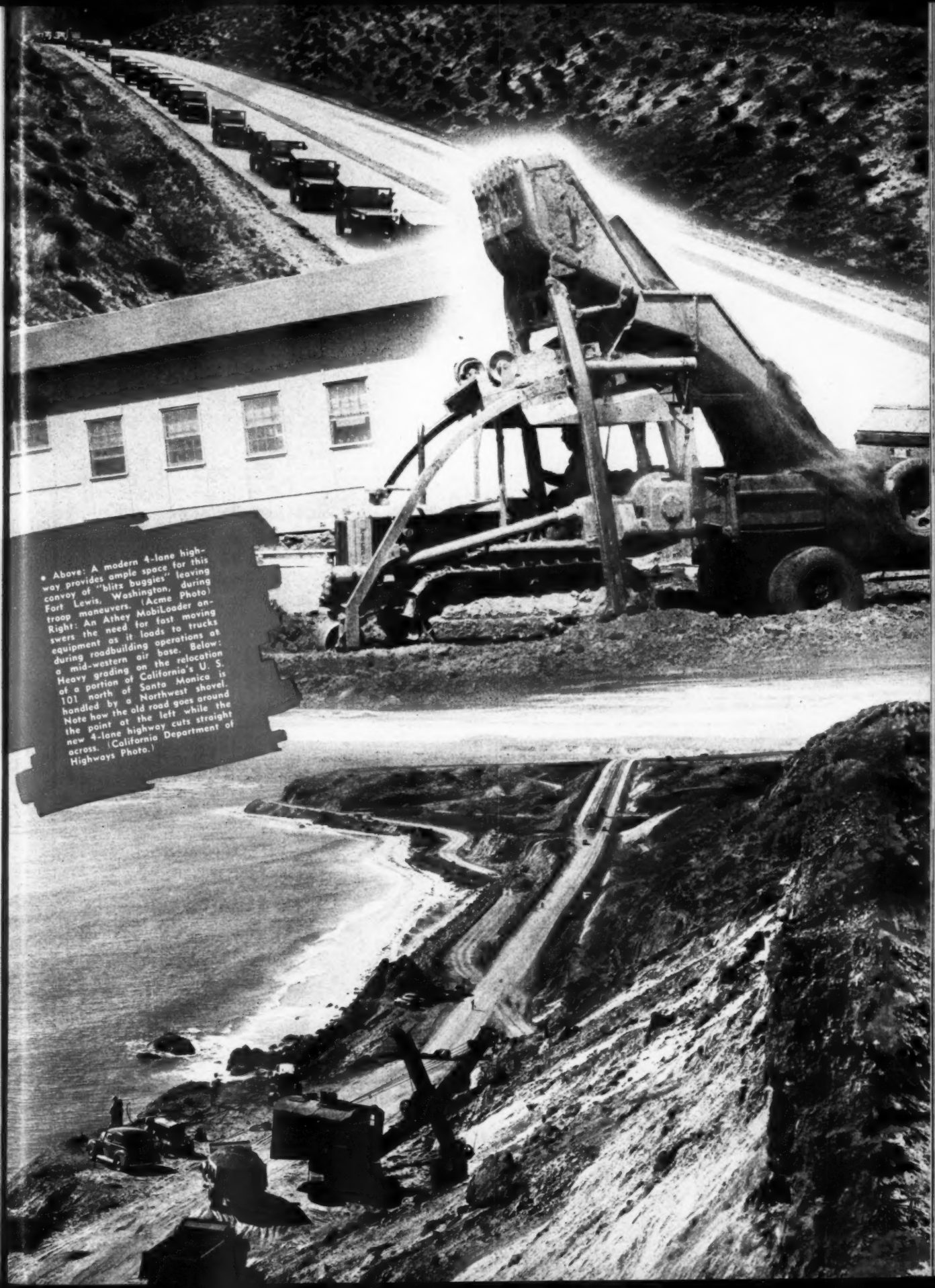
Tentative figures furnished by Mr. Williams show that $8,000,000 is anticipated for Colorado's 1942 program, including $5,250,000 for construction, $1,750,000 for maintenance and $1,000,000 for other highway department expenditures.

Sources of the 1942 funds include regular Federal Aid of $2,365,000, state gas tax revenue of $4,635,000 and $1,000,000 from other state funds.

Construction planned for 1942 includes 140 miles of grading and gravel surfacing at an estimated cost of $4,250,000 and 600 miles of oil treatment to cost $1,000,000. In addition, $3,000,000 in highway excavation previously awarded will be carried over into 1942.

Equipment purchases by the

• This bridge is the final link in a new 6-mile section of U. S. 24 which was built over Battle Mountain in Central Colorado by the state highway department at a cost of $700,000. The bridge is 470 feet long, 30 feet wide, and 209 feet high.



• Above: A modern 4-lane highway provides ample space for this convoy of "blitz buggies" leaving Fort Lewis, Washington, during troop maneuvers. (Acme Photo) Right: An Athey MobiLoader answers the need for fast moving equipment as it loads to trucks during roadbuilding operations at a mid-western air base. Below: Heavy grading on the relocation of a portion of California's U. S. 101 north of Santa Monica is handled by a Northwest shovel. Note how the old road goes around the point at the left while the new 4-lane highway cuts straight across. (California Department of Highways Photo.)

FEDERAL AID SECONDARY OR FEEDER ROAD PROJECTS

AS OF OCTOBER 31, 1941

STATE	COMPLETED DURING CURRENT FISCAL YEAR			UNDER CONSTRUCTION			APPROVED FOR CONSTRUCTION			BALANCE OF FUNDS AVAILABLE FOR PROGRAMMED PROJECTS
	Estimated Total Cost	Federal Aid	Miles	Estimated Total Cost	Federal Aid	Miles	Estimated Total Cost	Federal Aid	Miles	
Alabama	$ 832,405	$ 414,568	35.8	$ 991,152	$ 506,990	51.9	$ 165,900	$ 77,280	5.9	$ 294,164
Arizona	67,371	48,972	4.5	194,180	143,267	9.5	68,387	47,600	4.0	307,364
Arkansas	330,055	164,276	27.4	235,449	117,623	17.4	331,004	165,436	14.3	68,426
California	522,510	318,740	12.4	1,032,408	738,548	9.9	129,976	74,930	3.6	409,896
Colorado	142,204	70,526	20.7	129,755	72,649	2.1	4,602	2,598	1.9	262,976
Connecticut	105,456	49,907	1.8	458,826	202,361	9.1				76,648
Delaware	31,959	15,265		274,043	135,122	12.3	102,873	37,617	3.9	158,720
Florida	118,966	59,483	4.4	1,046,553	528,727	7.4				232,834
Georgia	293,032	131,516	26.7	993,558	589,129	61.8	833,048	416,524	73.5	697,801
Idaho	163,914	97,878	12.0	188,523	116,006	17.7	144,882	63,255	7.0	145,326
Illinois	680,650	337,436	28.6	1,434,510	717,255	76.4	31,700	12,600	7.1	286,246
Indiana	90,900	45,450	2.8	1,648,805	791,246	83.7				599,828
Iowa	508,912	240,491	124.3	363,952	153,398	71.6	245,880	115,426	43.0	252,470
Kansas	348,387	176,679	54.6	1,944,652	974,493	132.3	443,636	221,159	33.6	668,146
Kentucky	413,140	97,595	15.0	1,377,687	355,843	82.0	786,685	199,174	32.4	110,785
Louisiana	558,248	227,059	20.6	6,460	3,230		289,362	138,761	21.5	446,956
Maine	14,200	7,100	.8	251,758	125,879	11.7	63,650	26,114	2.2	9,491
Maryland	135,000	67,500	8.1	585,000	292,325	13.7	82,000	41,000	.8	202,116
Massachusetts	163,235	85,298	4.1	651,150	342,642	10.1				361,339
Michigan	323,068	161,491	27.2	1,307,660	653,830	61.0	727,370	363,685	23.0	71,980
Minnesota	829,633	420,567	113.5	1,562,365	783,990	171.8	539,972	255,078	48.8	103,952
Mississippi	477,700	238,850	20.6	1,012,161	491,346	49.7	1,008,600	367,376	45.2	112,643
Missouri	285,184	142,198	36.0	747,240	359,779	78.7	420,266	168,538	54.2	583,029
Montana	311,504	176,926	50.7	241,662	137,374	26.7	65,917	37,480	4.8	577,423
Nebraska	102,684	50,743	13.5	681,717	348,749	68.5	83,106	41,553	41.1	338,426
Nevada	118,591	103,169	12.8	129,863	93,360	9.7	159,363	138,486	10.8	2,981
New Hampshire				338,140	167,149	8.2	52,105	3,572	.1	89,289
New Jersey	246,870	123,355	5.1	624,812	329,865	16.5	82,910	41,455	1.8	353,335
New Mexico	413,533	259,915	42.6	189,504	122,533	15.1	167,514	101,129	5.1	6,907
New York	751,962	378,224	20.8	1,053,146	534,664	21.3	75,000	37,500	1.0	502,500
North Carolina	129,990	64,995	11.1	742,847	401,478	60.1	69,820	20,000	5.0	254,103
North Dakota	49,569	26,558	2.4	3,434	3,434		808,050	793,860	42.7	485,901
Ohio	845,072	422,280	30.2	1,709,240	901,810	37.1	115,000	57,500	4.7	795,592
Oklahoma	246,780	130,349	9.7	127,338	67,173	11.9	884,486	467,008	68.3	723,546
Oregon	324,677	162,124	26.6	487,315	260,529	30.8	134,541	51,670	14.1	120,289
Pennsylvania	620,078	310,039	14.1	1,887,581	932,724	33.9	72,000	36,000	1.8	43,101
Rhode Island	88,194	44,040	.9	139,310	73,157	1.7	3,610	1,805		56,220
South Carolina	310,932	100,066	33.9	690,000	284,224	21.2				165,627
South Dakota	32,130	18,006	15.2	3,622	3,622		1,143,430	1,047,600	114.5	490,587
Tennessee	230,843	114,430	8.1	1,479,414	739,707	47.9	234,030	117,015	8.7	409,820
Texas	561,809	272,011	59.3	1,047,627	504,517	95.1	429,420	201,550	40.8	1,168,978
Utah	186,949	123,241	17.0	62,245	32,943	2.5	79,538	36,884	1.0	172,273
Vermont	36,231	18,109	1.2	2,558	1,279		168,097	75,058	7.8	9,258
Virginia	339,398	155,485	11.1	374,996	171,246	9.1	59,050	29,525	4.5	351,901
Washington	151,705	92,113	16.2	565,560	265,814	15.4				149,770
West Virginia	86,300	43,150	2.4	623,774	311,274	23.8	15,700	7,850		313,609
Wisconsin	598,433	350,225	34.5	1,815,193	809,663	56.2	76,393	36,920	.8	124,441
Wyoming	364,162	157,111	18.8	464,237	204,529	31.7	43,601	16,400	2.6	721
District of Columbia	80,772	39,924	.9	2,558	1,279					76,120
Hawaii				2,375	2,375					249,562
Puerto Rico	45,960	22,305	2.5	185,404	90,550	8.1				134,883
TOTALS	14,811,257	7,377,738	1,063.5	34,113,319	16,992,699	1,694.3	11,442,474	6,191,971	807.9	14,630,299

state totalled $225,000 during 1941. No highway funds were diverted to other uses during the year.

Connecticut

Tentative figures indicate that Connecticut will have approximately $19,562,000 available for 1942 road work. Included in this sum is a proposed $10,230,000 construction program, with $5,440,000 planned for maintenance and $3,892,000 for other highway department expenditures.

Funds for 1942 will be derived mainly from state gas tax funds, which are expected to contribute $11,140,000. Vehicle license fees and other state funds will total $8,360,000, and regular Federal Aid will amount to $900,000.

No figures on Connecticut's 1942 construction program are available as yet. An indication of construction activities in the state insofar as the Federal program is concerned is gained from the October 31, 1941, report on these projects. At that time, Connecticut had one grade crossing project under construction at a total cost of $61,712 and one approved for construction, to cost $231,374. On secondary road projects, the state had 9.1 miles under construction to cost $458,826; Federal Aid highway projects included 22.8 miles under construction at a cost of $1,839,282, plus 14.9 miles approved for construction to cost $1,121,015.

Equipment purchases during 1941 totalled approximately $580,000, and an additional $114,000 was spent for equipment rental.

Delaware

Samuel Knopf, principal assistant engineer, reports that funds for Delaware's 1942 program will include an estimated $830,000 in regular Federal Aid and $225,000 for access roads, plus a state appropriation including $2,250,000 from state gas tax revenues and $1,000,000 from vehicle license fees and other state funds.

Although actual construction plans are necessarily difficult to forecast, the tentative program for 1942 is reported as follows:

	Miles	Cost
Grading	4	$ 70,000
Surfacing		
Gravel or crushed stone	12	80,000
Oil treatment	200	80,000
Paving, high type	30	650,000
Paving, low type	10	80,000
Bridges (number)	6	1,100,000

During 1941, the state spent $90,000 on equipment purchases, and paid approximately $5,000 in equipment rentals.

Florida

(No information available.)

Georgia

(No information available.)

Idaho

No information as to Idaho's 1942 road funds or construction program is obtainable at present. However, officials report that the following program was virtually completed in 1941:

State and Federal Highways:

Grading and draining	250 miles
Surfacing	276 miles
Concrete pavement	10 miles
Oiling	140 miles
Seal coating	160 miles

County Highways:

Grading and draining	279 miles
Surfacing	286 miles
Oiling	123 miles
Seal coating	40 miles

9 major bridges, and repairs to 3 major bridges; 3 underpasses.

In addition to the above, the state with its own forces renovated approximately 275 miles and seal coated 365 miles of the main highway system.

Work listed above involved the following funds:

Federal	$2,389,258
Federal Aid Secondary	368,447
State	3,430,161
Other	1,895,022

• A portion of the long line of guns and men that rolled down Chicago's Michigan Boulevard as the Windy City's own 33rd Division passed in review last Armistice Day. (Acme Photo)

Illinois

Uncertainty as to the effects of the war emergency on highway department activities has made it impossible for officials to announce any definite plans for 1942, other than work awarded under contract in 1941 which will be carried over into 1942. This includes 35.97 miles of high type paving, 3.0 miles of bituminous surfacing, 26.9 miles of oil treated gravel, 6.79 miles of oiled earth, 18.25 miles of graded earth, 13 bridges and 12 railroad grade separations.

During 1941, the state completed 170.63 miles of high type paving, 32.5 miles of bituminous surfacing, 61.09 miles of bituminous seal coat, 100.4 miles of oil treated gravel or crushed stone, 12.6 miles of traffic-bound gravel, 66.34 miles of graded earth, 47 bridges and 13 railroad grade separations.

In Federal Aid projects, the October 31, 1941 report shows that Illinois had 19 grade crossing projects under construction totalling $2,161,884, with 37 more approved for construction at an estimated cost of $420,414. Secondary or feeder roads under construction totalled 76.4 miles to cost $1,434,510; approved for construction were 7.1 additional miles to cost $31,700. There were 136.3 miles of Federal Aid highway under construction at $8,198,935, with 6.3 miles approved for construction to cost $1,258,998.

(Continued on page 38)

McNeil & Zoss, Los Angeles contractors, use assembly line methods on a "hurry up" defense housing job, completing homes for 3,000 families in 159 working days

By FLOYD SUTER BIXBY

Building a City To

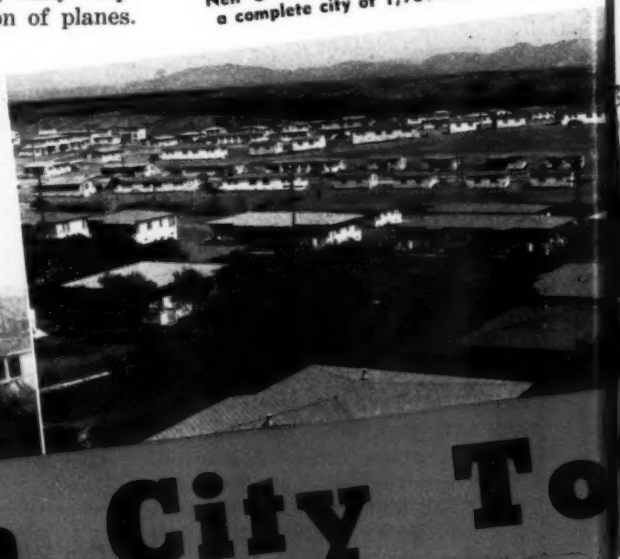
SAN DIEGO WAS expecting company, important company. It was the kind of company that rated the best the city had to offer. So the sleepy old California town set the table with Sunday plates, so to speak, shined up the silverware; yes, and even ordered a spare bedroom built in the north wing of the old manse.

Uncle Sam got a bit extravagant, maybe, when he invited those 30,000 guests down for the year but somehow San Diego managed to take care of them.

The city is the western home of the U. S. Navy. Here too, is the main plant of the Consolidated Aircraft Corp., daily stepping up its production of planes.

With naval recruits, new officers and their families coming in, the problem of housing became acute. When it became apparent that there simply wouldn't be any place for the newcomers to sleep, the government stepped in to take a hand in the situation. Under the supervision of the Public Buildings Administration a cost plus contract was let jointly to the McNeil Construction Company and the Zoss Construction Company of Los Angeles for the erection of a 3,000 family defense housing unit.

The job is a city in itself. Situated about 2½ miles north of San Diego near Old Town, the project



• Left: Excavation of a utility main at Linda Vista calls for the services of a Bucyrus-Erie 10-B dragline. Below: The fruits of McNeil & Zoss production methods, a complete city of 1,767 homes.

• Above: Seven foot holes on three foot centers were placed by compressor and jackhammer crews to blast an unusually dense hardpan so that sewer trenches could be excavated. Right: A P&H Model 150 trench hoe does its bit on the 45 miles of utility line excavation.

Many smaller industries within the city are also expanding to meet the demands imposed by the national defense program. Many new men have been coming into the city. The schedule of Consolidated Aircraft alone called for a personnel increase of 15,000 men, boosting their total strength to 30,000 employees.

Order for Uncle Sam

• Below: A Lima Paymaster drag-shovel at work on a lateral sewer line trench. Right: Three feet of boggy loblolly on a bed of hardpan was a constant problem. Here a Caterpillar-LeTourneau unit 'dozes a soggy mess.

covers 1,300 acres of a high plateau. Wide streets, 17.5 miles of them, parks, recreational areas, schools and theaters are all included in this unprecedented job. Many basic designs, spread around by the architects, have insured a variety of homes. To get away further from any dull similarity of homes within the same block the architects have even specified 68 different paint colors!

Because the job was so large, and because so little time was allowed for its completion (300 calendar days from January, 1941), a considerable expansion of the contractor's organization was necessary. Both the McNeil and Zoss firms had handled building and highway work, but neither contractor had on hand the necessary machines for doing a job of this size.

Linda Vista, as this new city is called, extends two miles along the main axis of the central ridge of Kearney Mesa and is a mile in width. In this area 17.5 miles of roads were built and paved, foundations dug for 1,767 homes, 45 miles of water and sewer pipe laid and the water and sewer systems installed. The water system includes a 5 million gallon covered reservoir and a 500,000 gallon elevated water tank, while the Linda Vista sewage disposal system, another major excavation problem, is a bio-filtration type system of 1,200,000 gallon capacity, with a recirculation of three times that amount.

The irregular terrain and deep canyon cuts presented an unusual excavation problem, taxing the ingenuity of the engineers, and second only to the condition of the soil itself.

• Left: Pushing a load of conglomerate, a Crook 'dozer mounted on an Allis-Chalmers HD-14 builds a road adjacent to the contractor's material yard. Above: Linda Vista's 1,200,000 gallon capacity bio-filtration sewage disposal plant was one of the project's major excavation tasks.

Exploration work at the job site disclosed an unusually tough excavation condition which had to be reckoned with in the height of the rainy season for the job to be started at all. The wettest season in 51 years of southern California history was deluging the countryside. And the housing site was a discouraging mess. About three feet of boggy loblol-

• Its trench digging duties completed, a Bucyrus - Erie 10-B assists pipe laying crews in their work. Note the rocky nature of the soil.

ly laid up on a bed of hardpan. Grass growing on the bog kept it porus and prevented it from settling and sealing itself. By and by the bog got so mushy that a tractor would sink in and get stuck unless the machine lowered its bulldozer and pushed a furrow of soft material out ahead while the tracks rolled along on the hardpan underneath.

This top layer was so soft that it was out of the question to remove it with anything but bulldozers. A fleet of 21 rented D-8 Caterpillars carrying LeTourneau bulldozers and power control winches was brought in. Two Allis-Chalmers HD-14's with

• A Parsons Model 31 trenching machine excavates main ditch lines through tough hardpan that has been broken up by dynamite.

Crook bulldozers and power units were added to this fleet after the work was started.

There was just one basic thing to do in the 1,300 acre tract, and that was to criss-cross it with access roads so the construction materials might be hauled in somewhere fairly close to the site of the new houses. Before the machines had scooped very much of the mud away everybody concerned knew they were up against a problem better suited to a flock of ducks than to a fleet of trac-

tors. The Caterpillars wallowed back and forth, pushing the ooze off the plateau and down the steep walled sides of the canyon. The material was actually so plastic and so saturated with water that it ran sluggishly for a full mile down through the canyon before coming to rest.

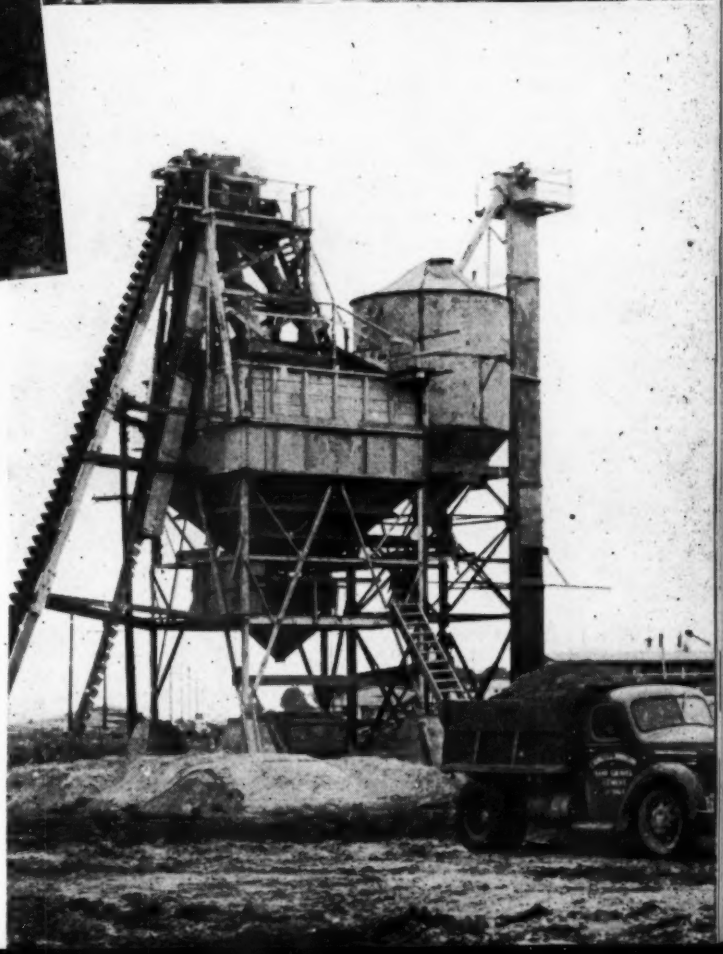
The two Allis-Chalmers tractors and many of the Caterpillars were brand new, having come off the salesroom floor to the project, but it didn't take but a few hours work in the mud to change their complexions. Before long each machine was a dun colored mudball. Track rollers on the Caterpillars, which were greased at least once in 24 hours, were inaccessible until the track assembly was first washed down with water from a fire hose.

'Dozing the soggy mess off the hilltop was only half the job. The excavated area had to be filled with something solid before the bog adjacent to the haul roads had a chance to squeeze in. There was some excavation in harder material necessary on an exit road down the canyon a half mile

(Continued on page 65)

• Concrete is placed by a Northwest crane to form a cradle for the outfall sewer leading from the new housing project.

• Above: Six McNeil & Zoss bulldozer-tractor units change California topography to suit as they trim a slope at Linda Vista.



• Producing 90 yards of concrete an hour, this central batching plant provided a correctly balanced mix for the entire project.

HAWKINS KEEPS

Keeping his equipment busy between excavating and grading jobs has led Neal Hawkins of Gastonia, North Carolina, into the trucking and coal business. Here's the history of an enterprising contractor

By SPENCER JONES

IN 1911 A YOUNG man in Gastonia, North Carolina, scraped together what money he could and went into the grading and excavating business. His name was Neal Hawkins, and he had an idea that the way to make money with equipment was to keep that equipment busy, at any kind of work where effort meant a margin of profit. In those days horses were, of course, the chief motive power on grading and excavating jobs and an idle horse could eat up profits plenty fast.

Cellar excavations were the mainstay of most small contractors' businesses then as now, and Contractor Hawkins was no exception. His men dug cellars by hand, with drag scrapers and sometimes with wheel scrapers, the earth being hauled away in horse-drawn carts and wagons. Occasionally Hawkins got a job that topped the usual house cellar by enough to be called a real excavation. The cost of hand shoveling and horse-drawn scrapers, and their lack of speed, set him to studying the possibilities of using a small power shovel, although he had less than a year of experience with his own business to guide him.

Buying the First Shovel

After considerable thought, he decided to take a gamble and bought a little Universal shovel equipped with a Fordson motor. If he could keep it busy he was safe, if not, he was sunk. Fortunately Hawkins had in his employ a young chap named Robert Harry Dixon who quickly mastered the operation of the new shovel and who also was able to keep things moving along on a job. This left Contractor Hawkins free to go out after new business, and go after it he did, with the result that bigger jobs were awarded to him, such as the excavation for the City Lake at Gastonia, North Carolina, and the digging of the basement for Efird's store in the same city.

Between contracts and subcontracts for excavating and grading, a less alert operator might have left his mules, horses and wagons remain idle, but not Hawkins. He let it be known around Gastonia that if there was a load of anything that anyone wanted hauled any place, it would be done promptly at a reasonable price if there was a team and wagon handy. Just because he was a grading contractor didn't mean to this enterprising young man that his equipment should bring in no income if there was no grading to do.

Although Hawkins' available wagons were often ill-adapted to carry what was loaded in them, he did this occasional local transfer work so competently and reasonably that his part-time customers began to ask him why he didn't start a full-time hauling business. This would mean the purchase of more specialized equipment, which wouldn't be of much use in the excavating and grading business, and would mean also that Hawkins would be operating two businesses.

Assuring himself that there was enough potential transfer work to justify special trucks and vans for the purpose, Hawkins organized and is now president of Neal Hawkins Transfer Company, Inc., and began to solicit trucking in real earnest. To keep first his horse-drawn and then his motor trucks busy when transfer work slowed down, as any busi-

• Neal Hawkins purchased his first shovel, a Universal equipped with a Fordson motor, in 1911. Here it is at work on a store basement excavation loading to a horse drawn dump wagon.

SEM ROLLING

ness will in certain seasons, he branched out into the retail coal business under the name of Hawkins Coal Company, of which he is the owner.

It wasn't long before Hawkins was recognized as an authority on highway transportation, with the result that he was approached on the matter of gasoline haulage. Now, in addition to his other jobs, he is president of the R. & W. Transit Company, Inc., an organization which owns and operates gasoline tank trucks.

Robert Harry Dixon graduated from operating a shovel and became Hawkins' general superintendent, a position he held with notable competence for a period of 18 years until his sudden death December 31, 1940. The present general superintendent is T. A. Bryson.

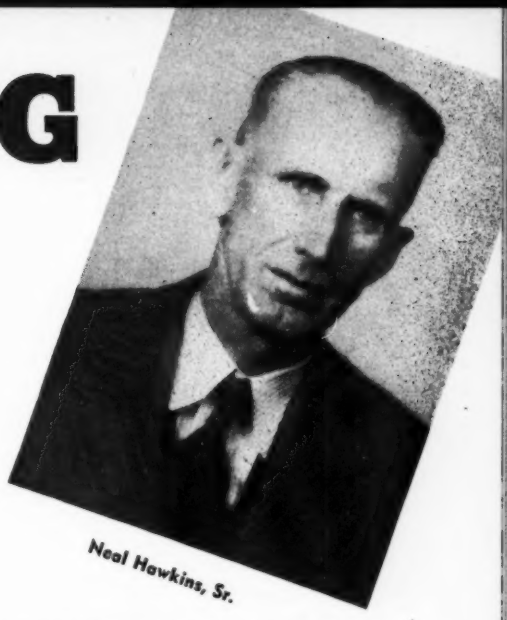
Grading and Excavating Activities

Today, Neal Hawkins is doing a flourishing business as a grading contractor. In fact, the transfer company, the coal company and the gasoline haulage company are all flourishing, and no one at the expense of the other, although they frequently work for each other.

For instance, the two level-deck trailers owned by one company will be called on to haul one of Hawkins' five shovels to a digging job; or one of the gasoline tank trucks may make the rounds with fuel for the shovels and tractors; or one of the tractors may help shove a big piece of machinery on one of the trailers.

In recent years Hawkins' sons, Howard F. Hawkins and Neal Hawkins, Jr., have become associated with their father. Howard F. Hawkins, 27 years of age, is interested in the trucking and transportation end of his father's business, while Neal Hawkins, Jr., only 23 years of age, is more interested in the Hawkins grading and contracting activities. Both of these young men show considerable promise, which speaks well for the future of the Neal Hawkins Companies.

At the present time Hawkins is operating three Bucyrus-Erie 10-B shovels, one Bucyrus-Erie 20-B shovel and one Lorain 40-A shovel. Other equipment includes one International TD-18 tractor, one International TD-14 tractor, one Allis-Chalmers Model K tractor with Baker bulldozer, one Caterpillar D-7 tractor with La Plant-Choate bulldozer, one sheepsfoot roller, one International TD-14 equipped with a Gar Wood Roadbuilder, two Galion patrol graders, one Farmall tractor roller, fifty 2-yard dump trucks of various makes, two 4-wheel Bucyrus-Erie scrapers (one 6-yd. and one 12-yd.), and two level-deck Rogers trailers.



Neal Hawkins, Sr.

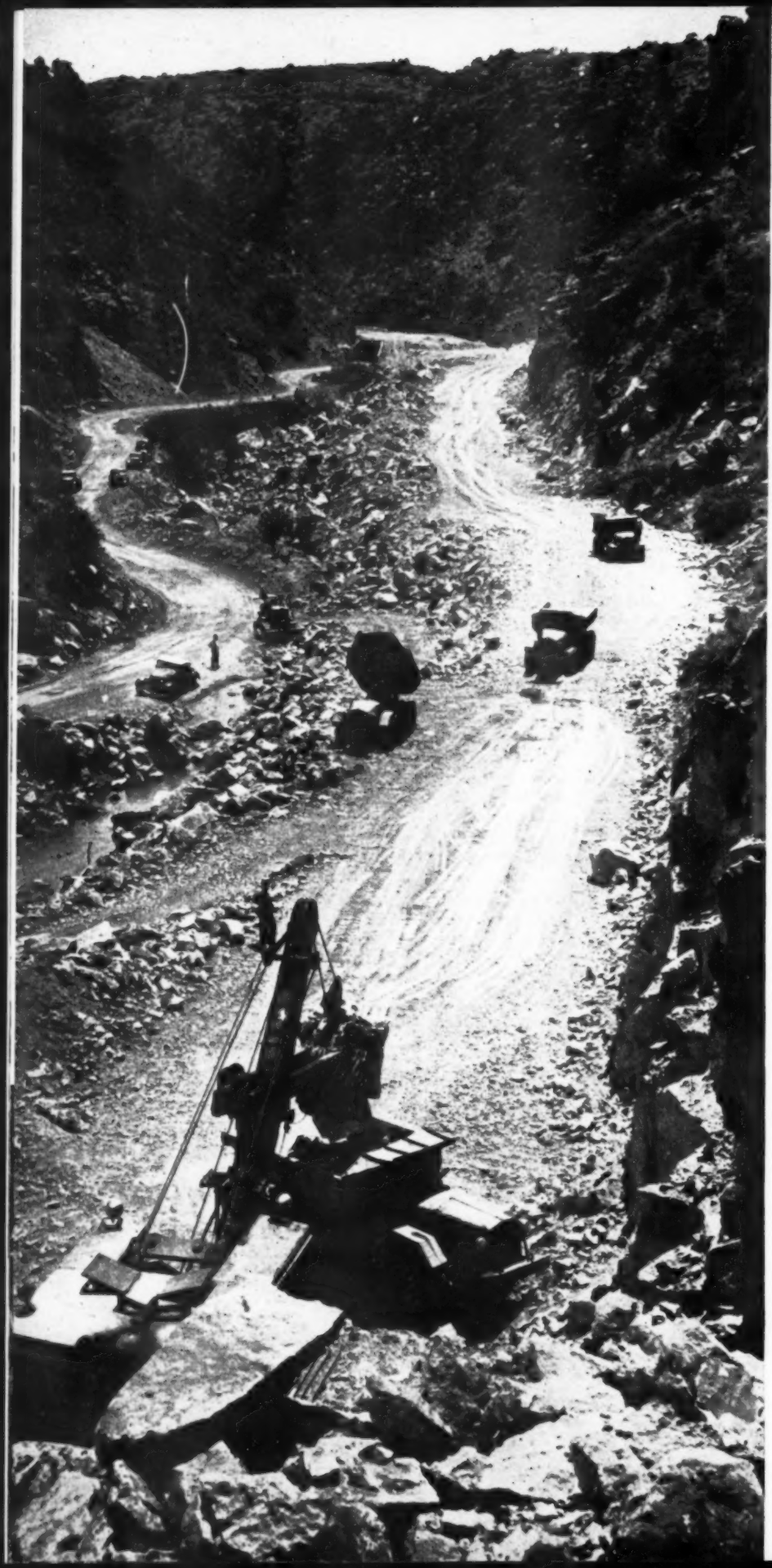
Buying Equipment With a "Margin"

This equipment is listed to indicate that Neal Hawkins, grading contractor, is in a position to handle most excavating or grading contracts that might be awarded to him. Most of the equipment previously mentioned indicates that Hawkins doesn't let himself in for equipment a little less than efficient for one business in order to make it usable in another of his enterprises.

(Continued on page 64)

• Each succeeding year brings more modern equipment under the Hawkins' banner. One of the dirt handlers on the company's Simon-Bright Housing Project contract at Kinston, N. C., was this Bucyrus-Erie 4-wheel scraper towed by an International tractor.

• A Bucyrus-Erie ¾-yard shovel at work for Neal Hawkins on the basement excavation of the Gay Theater at North Belmont, N. C.



RED BAXTER CAME OUT shooting. The swinging doors of the Black Dog saloon burst open, and Baxter, with smoke still curling from his .45, leaped astride his horse and galloped off through the mesquite toward Suicide Pass. The flat echoes of pistol shots stuttered back from the high walled canyon sides. That was Globe, Arizona, in 1888. Globe has come a long way since then. What was once the warring, Indian fighting country of Apaches and frontiersmen is now a peaceful city of 4,500 souls in one of Arizona's last copper producing districts.

Hardware stores still sell greased .45 slugs—to dudes who practice on tin cans. Stagecoaches still rumble down the colorful main street—on Rodeo Day. People no longer are afraid to travel to Superior; 30 miles westward. For Suicide Pass, a twisting passage through the rock walled mountains, is no longer alive with marauding Indians waiting in ambush. A few of the old timers still live who remember when the first road was built. That first highway, over which U. S. Routes 60 and 70 now wind, is being straightened by engineers of the Arizona Highway Department as funds permit. Just 22 miles west of Globe, deep down in Suicide Pass, W. E. Orr of Phoenix tackled a $228,000 contract.

A wealth of Indian lore and legend is connected with the Pass. Near the head of the job, where Contractor Orr moved in a Bucyrus-Erie 27-T churn drill to start the drill holes, the last of the hostile Indians were cornered. It was late in the 1870's when a detachment of U. S. soldiers from Globe rounded up the redskins. In a running gunfight between the Orr job and Superior many of the Indians were killed. The remaining few, rather than to surrender,

• The W. E. Orr organization tackled a man-sized digging job when they moved in to eliminate the narrow curves from a state highway winding through this rocky Arizona canyon.

Arizona Road Job

Hardboiled topography and traffic bypassing were W. E. Orr's toughest problems on a $228,000 state highway project

rode their horses to certain death over the precipice of Suicide Leap, a lofty, mineral shot mountain towering 2,000 feet high over the mining village of Superior.

The foreboding pass and towering rock walls would doubtless have caused many a contractor some concern. But Orr, identified for years with construction at El Paso, Texas, was at home in his native element. El Paso, being Spanish for "the pass," put Mr. Orr at home in just another pass to him.

Over most of the job, sheer walls of diorite protruded bare from the face of the canyon. In a few locations it was necessary to hire a labor crew to clear away scattered clumps of mesquite, juniper and manzanita. This was done well in advance of drilling.

Presence of scattered brush in this area, where it was found, was not indicative of extensive topsoil, for mesquite and manzanita grows with very little organic matter present. Stripping before drilling, therefore, was negligible. A Caterpillar D-8 mounted LeTourneau bulldozer, which scraped off the dirt and dumped it down the side of the canyon, was about all that was necessary.

Traffic Bypassing Problem

The Orr job, under the immediate supervision of Bill Orr, Jr., was not by any means a project where men and machines could simply move in and go to work. As the locale and history of the Pass imply, working quarters were extremely limited. The original road, following the lines and contours of least resistance through the canyon, took advantage of every level and every natural berm. Blasting was done only where absolutely necessary, and then only to lines or slopes which barely let the rock tower above without overhanging the highway. Contractor Orr's big problem, then, was to sit down and figure some method of taking care of a daily traffic count of 2,000 automobiles running through his 1.65 mile job. The major per cent of that traffic count ran through the job during the daylight hours when construction work was under way.

Near the Superior end of the job, the road, winding around a false point in the canyon, slowed traffic down considerably. The plans called for a new route in this section. To describe it generally, the new route followed down the opposite side of the narrow canyon, crossed back over toward the old road on a tremendous rock fill.

• "Cathedral Spires," a bit of local scenic splendor, provides an impressive background as a Caterpillar - LeTourneau bulldozer unit levels rock fill for the advancing highway.

and cut through the hard rock of the false point to straighten out the whole system. At the low point in the canyon a twin barrelled concrete underpass was designed to carry rain runoff through the massive fill and on down the Pass toward Superior.

That concrete underpass was the practical solution to Orr's most pressing problem. The underpass could be built first, involving no detour problem. Everything from that point on could be taken care of by timing all the other operations perfectly. Just how this was done is an interesting construction story, and it well illustrates the hours of planning which always goes into a project of this kind.

The concrete was poured from Rex mixers, and special care was taken in curing the finished underpass so that it would develop its maximum possible strength in the short time it would be left uncovered. While the underpass was in the process of construction, traffic was not disturbed, since it ran along the old original road.

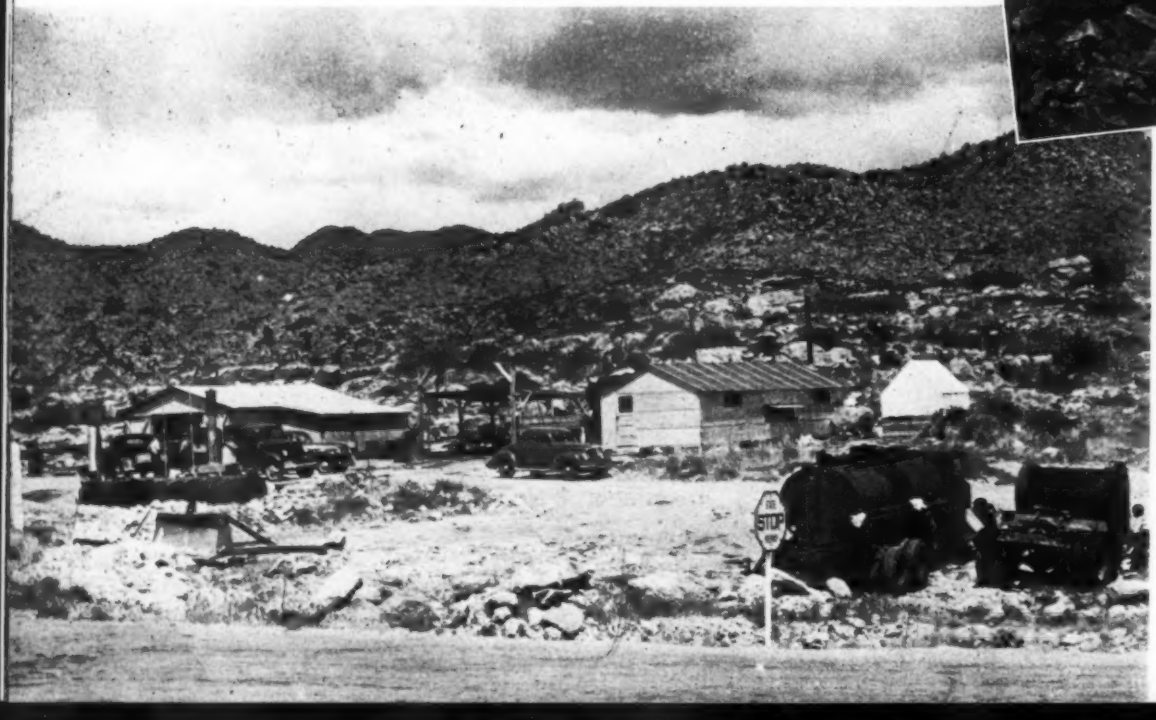
But there was a rock fill to go over the underpass; and before traffic could be safely detoured through that concrete tunnel the fill had to be placed. Drilling and blasting every inch of the way was necessary. A Bucyrus-Erie 27-T churn drill carrying an 8-inch drill bit on the end of its tool string was brought in and set up over the heavy cut back of the false point. The diorite rock through which the drill bit had to go was a form of lime, weighing about 140 pounds per cubic foot. It varied in hardness proportionately as the drilling records indicate. Performance records showed that from 20 to 35 feet were drilled per 8 hour period throughout the job. Holes in general were spaced on 20 foot centers, but local conditions coupled with a Mexican powder monkey named Pancho altered the general program somewhat—to suit Pancho, a veteran blaster who has been employed by Mr. Orr for 20 years.

In shallower cuts along the edges, and in places where the rock was not so heavy, two Cleveland drills, using Timken 3 to 2-inch detachable bits, were used. These machines were effective in cuts up to 35 feet in depth, and would drill 105 feet per 8 hour day with their smaller bits. In calculating drill performance it is always interesting to reduce the lineal feet of hole to actual volume. It is then generally found that the comparative volumetric performance between the two diameters nearly balance, with a tendency to favor the bit with the larger diameter. In other words, as much powder can be loaded into 20 feet of 6-inch hole as can be placed in 448 feet of 1¼ inch hole, which at first appears to be the larger quantity.

The diorite of Suicide Pass contained some ground water down at the lower levels. Ordinarily this is not the usual case in Arizona, but heavy winter rains made blasting in some parts of the state as water logged and difficult as were conditions in the eastern part of the country in the spring of 1941. Gelatin was used in the wet work, but over most of the job it was possible to pour in Apache 40% granular powder after having sprung the bottom of the hole with 1⅛ inch diameter sticks of 60% Amo-Gel.

Pancho Learns a Lesson

In Pancho, the powder monkey, the sporting instinct was strong. "Why," reasoned Pancho, "should one exert good energy under the Arizona sun laying out 1,000 feet of blasting wire when



• W. E. Orr's general headquarters for the "Suicide Pass" job consisted of office, mess hall and machine shop. At the right is the oil spreader used to apply oil for mixing the black top surface.

• A Bucyrus-Erie 2-yard shovel and seven 6-yard Hug dump trucks handled the loading and hauling of 180,000 yards of rock in the 1.67 mile contract.

• Below: Necessary secondary shooting was handled by crews using Ingersoll - Rand Jackhamers.

500 will do." True enough, there were more falling rocks to dodge at 500 feet, but Pancho was agile and as we have implied before, the sporting instinct which ran so strong through the Latin's veins sprang from a line of bullfighting matadors half again as long as were most lengths of his blasting cord.

Finally there came a day. The top of one of the drill holes was ragged, and it had been cased with a 10 foot length of pipe which could not be removed. Pancho ran out as few feet of blasting wire as he dared, and gave the exploding battery three pushes to warm it up before he hooked up the wires.

Fire!

Pancho tried to push the bottom out of the exploder. The side of the canyon crumpled and broke. But wait—what was that terrifying missle, that cylindrical looking bomb coming toward him? Blown 200 feet into the air by the force of the explosion, it was headed straight for Pancho's head. It was a new experience for the Mexican. He froze in his tracks, powerless to move. When the piece of pipe casing fell within a few feet of the frightened Latin, Pancho crossed himself.

"Carramba!" he muttered. "Next time I use a thousand feet, no. Maybe the whole dam' reel!"

Varying hardness of the rock reflected also in the amount of powder necessary to break it up. From ¾ pound to a full pound was used per cubic yard of stone shot down. Every effort was made to obtain thorough breakage, so that the rock could be loaded by the 2-yard dipper and incorporated into the fills. To do the small amount of secondary shooting necessary, six Ingersoll-Rand Jackhamers were alternated on 2 Ingersoll-Rand 315 foot per minute compressors which supplied the power.

It must constantly be borne in mind that the excavation quantities per mile of highway were unusually high. In the 1.67 miles of Mr. Orr's job were 180,000 cubic yards of rock to be shot, loaded, hauled and disposed of, either in the fill or in canyon waste areas.

Shovel Loading Operations

A Bucyrus-Erie shovel, swinging a 2-yard Amsco dipper, was brought in to do the loading. Seven Hug trucks with 6-yard bath tub type dump bodies were spotted under the shovel. The first big fill, it will be remembered, was the one using rock dug from behind the false point, and which carried the new road across the canyon over the concrete underpass.

This part of the fill was built up in several weeks time, working two shifts daily and very often working through heavy rainstorms. About 43 inches of rain fell between January 1 and May 15. Through it all the Bucyrus-Erie shovel dug and loaded; cycle after cycle, averaging 1,000 cubic yards per 8 hour shift. Persistently, as though determined to remove the mountains themselves, the machines worked on. The cut grew deeper and the fill raised higher and higher. Presently both reached their proposed common grade. One excavation leg had been finished. Now the traffic could be routed through the un-

(Continued on page 64)

Equipment you ought to KNOW ABOUT

For further details about the equipment on this page please write to the manufacturer, mentioning Excavating Engineer.

Radio telephone

Manufacturer: Communications Division, Weltronic Corporation, East Outer Drive, Detroit, Michigan.

Claims: A completely self-contained radio telephone combination transmitter and receiver weighing only 4 pounds, and not much larger than a handset of a "French" telephone. The unit is

available for governmental and public utility agencies. Individuals, of course, are subject to licensing by the Federal Communications Commission where required, as well as a priority rating. The power is supplied by standard commercial batteries and will render 8 hours continuous service. This is equal to a week to a month intermittent operation. The unit has a range of upwards of a mile and requires no tuning although the wave length is adjustable.

Light pump

Manufacturer: Chain Belt Company, 1600 West Bruce Street, Milwaukee, Wisconsin.

Claims: This 1½" pump contains all the engineering features of the standard line of Rex centrifugal pumps, including the patented "peeler," a device that actually peels the air from the whirling impeller and thus speeds up the prime. It has a large semi-steel recirculating water chamber and is powered by a dependable, easy-starting single cylinder, air cooled engine of one horsepower. The engine is equipped with an

automatic governor that speeds up the motor when the pump catches its prime and starts to lift water. This eliminates the possibility of putting too much strain on the power unit at low speeds and assures economical performance. The 3M water mover was designed mainly for the contractor to pump water from excavations and to keep seepage levels low on bridge jobs, or any individual or organization that has water moving problems to contend with. The overall dimensions are 15¼" long by 11¾" wide by 15¾" high, with a weight of only 57 pounds.

Mobiloader, Model 8

Manufacturer: Athey Truss Wheel Company, 5631 W. 65th Street, Chicago, Illinois.

Claims: Exhaustive tests for more than two years on actual operations in mines, quarries, on highway and earthmoving jobs, the manufacturer states, has proved the many advantages in speed and loading efficiency that the Model 8 Mobiloader has. It digs at the front and dumps overhead to the rear, employing the same principle as the W4 Mobiloader. With bucket capacities ranging from 2.7 to 9½ cubic yards, depending upon the type of materials to be handled, the Model 8 Mobiloader loads earth, ore, sand, clay, coal, gravel, stone and many other materials.

Respirator

Manufacturer: DeVilbiss Company, Toledo, Ohio.

Claims: Approved by the United States Bureau of Mines,

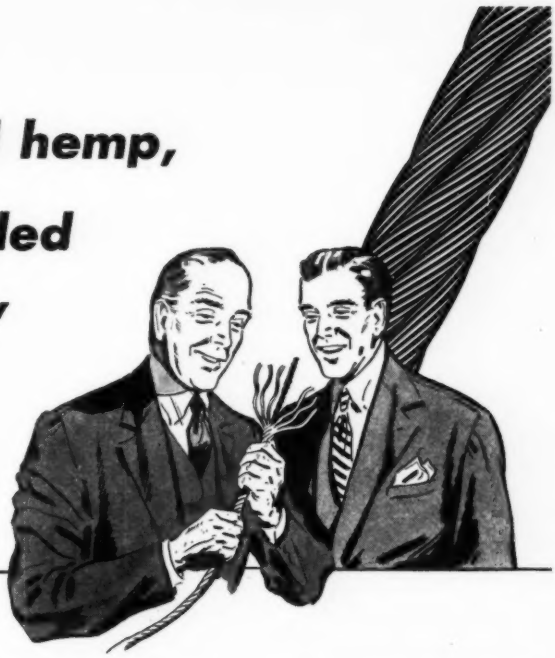
the new DeVilbiss "M S D" Respirator is said to embody nine unique features. These combined, make it more compact, lighter, easier to breathe through, more comfortable to wear, and easier to clean and maintain than previous models. The new respirator, a scientifically and compactly designed cartridge, measures only 2⅞ by 1½ inches and weighs but one ounce. The filter is easily cleaned by blowing accumulated dust from vanes with an air dusting gun or nozzle, thus maintaining peak performance and requiring less frequent replacement.

Compressor

Manufacturer: Schramm, Inc., West Chester, Pennsylvania.

Claims: Built in sizes ranging from 120 to 600 cubic feet displacement, these outfits are made available for those applications

"You put in steel, and hemp, and something called Experience . . ."



It's something only time and tasks can bring

"Make all the tests you want of wire rope samples. Pull them apart, into steel and hemp, and still you'll never find the quality that's paramount. The makers' experience . . . *knowing how.*

Our experience here at Roebling has two dimensions. You can count it on the map or on the calendar. You can see it working from the ingot to the finished reel.

When Doctor Beebe's Bathysphere sank down into the ocean's depths, a full half mile, his lifeline back to sunlight was a single length of Roebling "Blue Center" Wire Rope. When the builders of Mud Mountain Dam, Enumclaw, Washington, built a 35,000 pound tent that would cover half a city block, to protect their fill, Roebling Wire Rope was chosen to support its immensity, to hold against wind and rain.

Equipping the world's largest power shovel . . . building the Golden Gate and George Washington bridges . . . lifting lives from the world's deepest mine . . . Roebling is both the teacher and the pupil, whenever we tackle such a job. All across the country, on its lakes and oceans, Roebling's learning every day ways to make "Blue Center" better than before. Experience . . .

As Roebling field men learn from rope at work, new generations here at Trenton are learning secrets from the old. Father is teaching son how to tell when an ingot is ready to leave the soaking pit, to be kneaded into Roebling billets. Roebling engineers are learning more and more of wire rope's jobs, and how to meet them to a 'T'.

Roebling research is uncovering brand new facts that will make this trade mark mean even more to-morrow . . ."

Experience of men in the Roebling mills, of Roebling men in the field . . . Roebling process control, and engineering, and research . . . there's many a hidden ingredient in "Blue Center" Wire Rope. Reasons why it lives so long, and never fails to deliver its full measure of service.

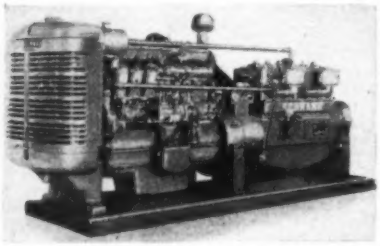
JOHN A. ROEBLING'S SONS COMPANY
TRENTON, NEW JERSEY
Branches in Principal Cities

THAT'S THE ONLY WAY TO MAKE

ROEBLING
"Blue Center"
STEEL WIRE ROPE
PREFORMED OR NON-PREFORMED

For your convenience in writing to John A. Roebling's Sons Company, you will find a card bound in this issue.

not reached by electric power service or where gasoline, oil, distillate or diesel power units are preferred as a driving medium. A

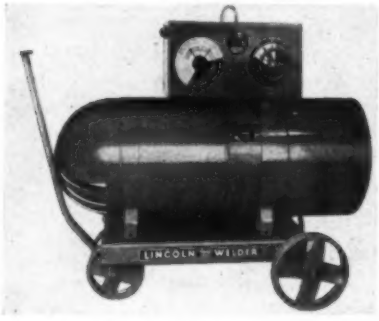


number of standard assemblies have been provided in semi-portable and stationary types. Mounted on a sturdy deck type base, these light, compact, easy-to-handle combinations are used with equal success for semi-permanent service on contracting or tunnel work, prospecting, mining, or where the demand for air is such that it is not economical to operate large compressors. Also, for installation in isolated or arid locations where running water is not available, all of the advantages of water-cooling may be retained by using Schramm radiator water cooling.

Arc welder control

Manufacturer: The Lincoln Electric Company, 12818 Coit Road, Cleveland, Ohio.

Claims: Advantages of the new development, as emphasized by the manufacturer, include ability

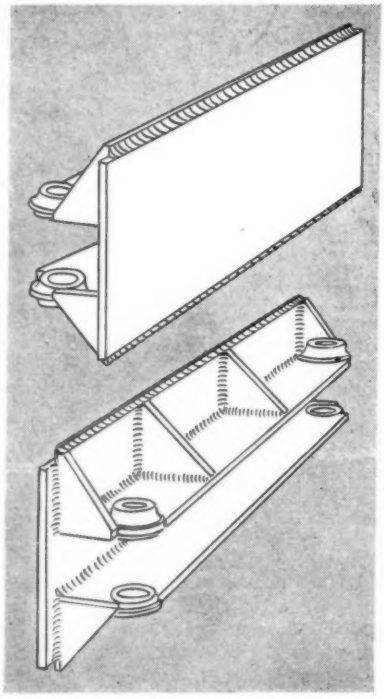


to set and read the current from the dial; elimination of trouble and expense resulting from meter breakage; elimination of meter inaccuracy after a few months use in service in the field; availability of positive polarity by noting position of switch handle. By virtue of the simplicity and accuracy which the new advance makes possible in all applications of arc welding, and because of the lowered price, the new Lincoln welder becomes a greater aid in meeting present-day demands for fastest possible welding at low cost in production for our war program.

Push Dozer and Pads

Manufacturer: Buckeye Traction Ditcher Company, Findlay, Ohio.

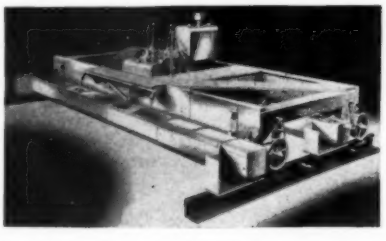
Claims: Development of a new line of Unitilt Push Dozers and



Push Dozer Pads for use on Buckeye bulldozer frames. These units are now being built in two sizes 24″x61″ for Allis-Chalmers HD-14 and HD-10-W tractors, International WTD-18 and WTD-14 tractors and Cletrac FD Series machines; 24″x57″ for Allis-Chalmers HD-10 and International TD-18 tractors. The Dozer Pads are interchangeable on the same frame with Buckeye Bulldozer and Trailbuilder blades.

Concrete finisher

Manufacturer: Jaeger Machine Company, 520 Dublin Ave., Columbus, Ohio.

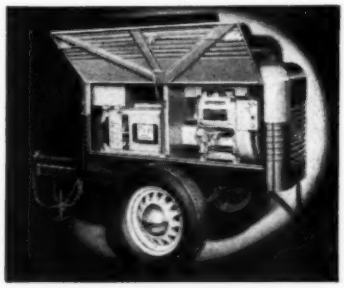


Claims: Latest type Jaeger-Lakewood finisher has automotive-type, 4-speed transmission mounted in front of engine, enabling operator to control any function by single direct lever movement. Gear-selected working speeds to 18 feet per minute and independent gear-selected screed speeds to 80 strokes per minute give maximum flexibility of operation and finishing capacity equal to largest dual drum pavers handling driest mixes. Hydraulic screed lifts, single lever steering, telescopic width changes up to 4 feet and quick wheel changes and crown changes are other features.

New welders

Manufacturer: Harnischfeger Corporation, 4400 W. National Ave., Milwaukee, Wisconsin.

Claims: Two new P & H Hansen gas-driven welder units with capacities of 15 to 200 amps and



30 to 260 amps. They are powered by a direct connected heavy-duty 4-cycle, 4-cylinder, V-type Wisconsin gasoline engine. Hinged side panels allow ready access to generator and engine. Compartments provide ample storage for tools, welding rod, etc. The units are mounted on pneumatic tired trailers with low centers of gravity which permit towing at normal traffic speeds.

Mine telephone cable

Manufacturer: General Electric Company, Schenectady, New York.

Claims: A new mine telephone cable with the mechanical and electrical strength of large cables but a diameter of slightly over ¼ inch. This twisted pair, No. 14 Awg solid cable is designed for mine telephone service where induced currents and cross talk must be reduced to the minimum. Versatol insulation makes the cable heat and moisture resistant. A tellurium-compounded rubber jacket insures protection against mine waters and soil acids.

TEN 10-Bs for ELLIS & CLINE in 4 years!

THAT'S a record that speaks for itself - and for the 3/8 yard 10-B. To explain that record a little, here's what John Thompson, office manager for Ellis & Cline has to say:

> "We believe that the 10-B is one of the most profitable units from an investment standpoint that we have ever owned. This is due in large part to its adaptability for various types of work and its speed. It is light enough to be transported on a Ford truck, and heavy enough to do any excavating that a shovel of its capacity would be expected to do. The 10-B proved itself particularly valuable to us in the work at the airport at the Norfolk naval base and at Fort Bragg."

Two of every three Bucyrus-Eries sold are repeat orders. Plan now to put Bucyrus-Erie performance at work for you.

Bucyrus-Erie

SOUTH MILWAUKEE, WISCONSIN

Shots from the FIRING LINE

House Passes U. S. Defense Highway Bill

The U. S. House of Representatives on December 5 passed and sent to the senate the $8,000,000,000 third supplemental national defense appropriations bill with provisions for defense highways as follows:

$ 74,600,000 in direct appropriations for access roads to defense plants and military and naval reservations, to be spent under direction of the Federal Works Agency;
50,000,000 in contract authorizations for defense roads;
5,000,000 for airplane landing and take-off strips along the highways.

No appropriation was made for improvement to the strategic network of highways or for surveys and planning.

The above contrasts with authorizations for defense highway appropriations totaling $220,000,000 in the Defense Highway Act of 1941 which provided for:

$150,000,000 in federal funds for access roads to military and naval reservations and defense plants;
25,000,000 for improvement to the strategic network to be matched 25% by the states and 75% by the federal government;
25,000,000 in federal funds for improvement to the strategic network, to be spent under direction of the Federal Works Agency;

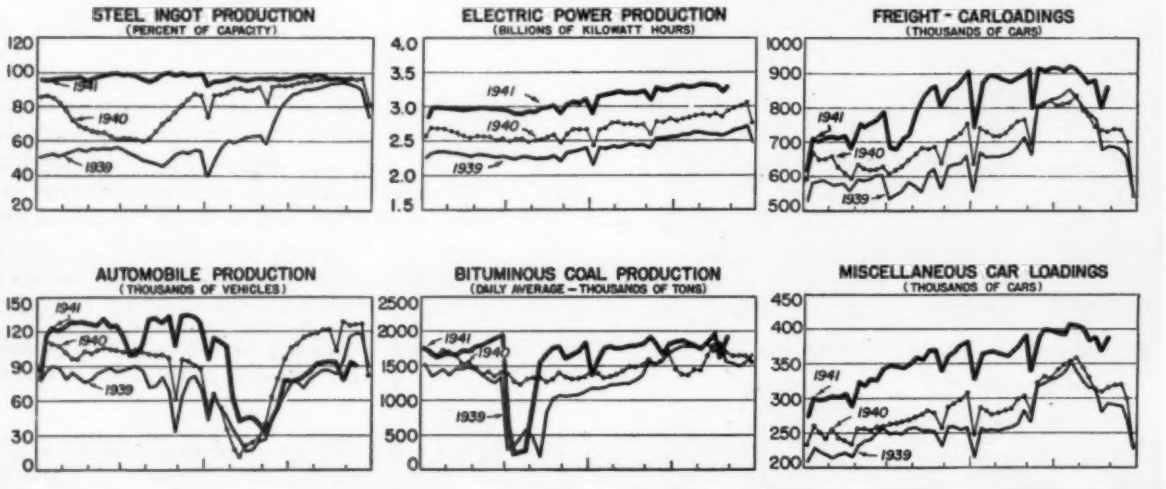
• One of Ohio's largest road projects for '41 was a 4.54 mile relocation of State Route 8 near the new Dover Dam. The rock riprap work shown here is part of the 777,000 yards of grading being handled by Contractor Frank Mashuda on the project.

10,000,000 for airplane landing and take-off strips alongside highways;
10,000,000 for surveys and planning.

After signing the Defense Highway Act, President Roosevelt transmitted to congress a budget estimate calling for $125,000,000 for access roads and $10,000,000 for flight strips. No request was made for strategic network funds or for surveys and planning.

It is pointed out in official circles that there is no immediate necessity for actual appropriation of funds for improvement on the strategic network. The $50,000,000 authorized in the Defense Highway Act for strategic network improvements is expected to be apportioned or allocated by the Federal Works Administrator within the near future. Existing law provides that after this is done, the state highway departments may submit proposed projects to the Public Roads Administration and these when approved become contractual obligations of the federal govern-

MONTHLY BUSINESS INDICATORS



Now . . . A Big-Capacity Athey MobiLoader to Match

BIG SHOVEL PRODUCTION

DIGS AT THE FRONT

Substantial Savings in Initial Investment and Operating Costs

To extend the speed and economy of the MobiLoader to a wider range of uses, Athey offers the Model 8 MobiLoader . . . a companion to the job-proved Model W4.

Now, with greatly increased capacities and using the heavy-duty "Caterpillar" D8 Tractor for power, the MobiLoader enters a new field — makes available a mobile, cost-cutting loading tool that provides big output in less time at low cost.

The Athey MobiLoader uses the simple and time-saving method of digging at the front and dumping its load overhead at the rear, thus eliminating turning the tractor around for discharging the load. In that way, the MobiLoader does the job faster and cheaper, reduces operating expense and tractor wear, enables you to step up your production to more profitable levels.

Proved on actual operations for more than two years, the Model 8 MobiLoader has introduced shortcuts in the handling of ore, coal, earth, clay, gravel, crushed stone and all stockpiled materials — has displaced costly and antiquated methods and equipment.

Now's the time to assure utmost efficiency on your defense jobs. Get more facts on this big-capacity, mobile loader. Mail the coupon today for an interesting folder — sent without obligation.

Bucket sizes for Model 8 MobiLoader range from 2.7 to 4½ cubic yards, depending upon type of material. Model W4 MobiLoader capacity is 1½ cubic yards for general excavation and 3 cubic yards for snow removal.

Above photos show borrow pit excavation for material to build roads to Michigan bomber plant.

DUMPS AT THE REAR

MobiLoader on Mesabi Iron Range saves time and money loading iron ore concentrate into railway cars.

The Athey line includes Earth and Rock Trailers, Oil Field Trailers and Wagons, Logging Cruiser Wheels, MobiLoaders, Force-Feed Loaders and Trailer equipment for every hauling need.

ATHEY

MAIL COUPON TODAY

Athey Truss Wheel Co.
5631 W. 65th Street
Chicago, Illinois

Gentlemen:

Please send me, at no obligation, descriptive folder on the Model 8 MobiLoader.

I am interested in loading_____

Signed _____

Address _____

City _____

ment for the federal share of the cost as fixed by law.

Funds for access roads and flight strips are handled on a different basis and should not be confused with improvements to the federal aid system or the strategic network in which the states initiate all projects and pay part of the cost.

State Highway Receipts and Expenses for 1940

Receipts from state imposts on highway users and from other state income applicable to highways totaled $1,631,406,000 in 1940, and of that amount $1,013,321,000 was spent on state-administered highways, according to reports received from state authorities by the Public Roads Administration. Complete figures are given in the table below.

The disbursements for state highways were $201,665,000 more than in 1939, and resulted largely from increases in motor vehicle-user revenues.

Receipts for state-administered highways totaled $1,045,722,000 in 1940. These funds were derived as follows: $754,479,000 from highway user taxes; $13,057,000 from appropriations, bridge and ferry tolls, property taxes and other imposts; $169,942,000 from federal sources; $89,989,000 from bonds and notes; and $18,305,000 by transfer from local governments and from miscellaneous sources.

The disbursements for construction of state-administered highways totaled $463,389,000 on primary state highways, $30,274,000 on secondary roads under state control in 14 states, $26,905,000 on urban extensions of the state highway systems in 24 states, and $2,217,000 on state park and forest roads in 12 states.

Disbursements of 1940 Highway-User Revenues and Highway Incomes by States

State	Collection and Administration, Highway-User Revenues	State-Administered Highways*	County and Local Roads and Streets*	For Non-Highway Purposes
Alabama	571,000	17,774,000	8,544,000	834,000
Arizona	369,000	6,634,000	1,861,000	....
Arkansas	444,000	15,756,000	2,078,000	....
California	4,137,000	47,693,000	23,163,000	13,989,000
Colorado	828,000	10,305,000	3,561,000	....
Connecticut	1,012,000	18,434,000	3,226,000	6,000
Delaware	157,000	4,194,000	2,000	26,000
Florida	1,141,000	26,592,000	281,000	10,998,000
Georgia	1,160,000	28,199,000	5,628,000	3,816,000
Idaho	105,000	5,472,000	2,462,000	....
Illinois	2,159,000	39,070,000	22,270,000	7,037,000
Indiana	1,367,000	23,421,000	13,944,000	1,729,000
Iowa	815,000	21,809,000	9,893,000	....
Kansas	1,356,000	15,056,000	4,216,000	....
Kentucky	632,000	20,891,000	2,356,000	1,837,000
Louisiana	277,000	23,112,000	25,000	6,248,000
Maine	300,000	11,922,000	1,186,000	142,000
Maryland	433,000	19,447,000	6,025,000	1,338,000
Massachusetts	1,760,000	16,029,000	18,500,000	1,346,000
Michigan	2,529,000	36,871,000	28,003,000	....
Minnesota	780,000	21,916,000	8,332,000	247,000
Mississippi	406,000	22,801,000	7,797,000	....
Missouri	766,000	26,696,000	3,000	88,000
Montana	155,000	10,101,000	1,485,000	....
Nebraska	432,000	11,655,000	5,708,000	2,322,000
Nevada	69,000	4,158,000	27,000	....
New Hampshire	158,000	7,293,000	935,000	....
New Jersey	2,462,000	32,146,000	11,411,000	11,490,000
New Mexico	473,000	12,072,000	267,000	616,000
New York	3,305,000	64,219,000	27,440,000	63,982,000
North Carolina	696,000	37,970,000	....	1,133,000
North Dakota	257,000	5,385,000	1,710,000	3,000
Ohio	3,278,000	42,940,000	33,871,000	13,314,000
Oklahoma	1,483,000	14,377,000	7,414,000	232,000
Oregon	666,000	14,958,000	2,622,000	139,000
Pennsylvania	2,141,000	68,680,000	4,719,000	15,824,000
Rhode Island	279,000	3,734,000	56,000	3,942,000
South Carolina	292,000	19,873,000	2,422,000	217,000
South Dakota	148,000	7,029,000	1,952,000	107,000
Tennessee	1,040,000	18,841,000	6,218,000	7,932,000
Texas	2,709,000	46,635,000	18,744,000	11,586,000
Utah	204,000	5,102,000	999,000	37,000
Vermont	74,000	4,889,000	3,373,000	29,000
Virginia	590,000	27,240,000	438,000	9,000
Washington	714,000	29,614,000	8,979,000	618,000
West Virginia	126,000	25,709,000	....	....
Wisconsin	1,185,000	13,080,000	12,145,000	14,692,000
Wyoming	56,000	5,527,000	689,000	....
District of Columbia	197,000	....	6,136,000	255,000
Total	46,693,000	1,013,321,000	333,116,000	198,160,000

* Expenditures on county roads under State control in Delaware, North Carolina, Virginia and West Virginia are included with expenditures on State-administered highways.

AGCA Pledges Full War-time Cooperation

President M. W. Watson, of The Associated General Contractors of America, has made public a letter sent to the President of the United States offering the services of the members, staff and officers of the association for successful execution of the war. The letter follows:

"The Associated General Contractors of America, by action of its Executive Committee meeting in Washington today, places at your disposal the complete facilities of its members and staff. It reaffirms a pledge of cooperation given to you on September 8, 1939.

"American general contractors and their employees are already in the field of action, being at work for the Navy Department on the Pacific Islands.

"This Association was founded at the end of World War I because of the demonstrated need for such an organization through which the Government could communicate its needs to the construction industry, and through which services of the widely dispersed industry could be marshalled most efficiently for war service. President Woodrow Wilson in 1918 suggested the original meeting which resulted in formation of the Association.

"Throughout its existence the Association has maintained cooperative relationships with all Government departments having charge of construction. The Association has given assistance of value in the defense construction program, and stands ready to accelerate its efforts in war.

"The Association offers you the use of its facilities, and the wholehearted cooperation of its officers, staff and members in mobilizing the construction forces of the nation in the all out prosecution of this war to its successful conclusion."

November Construction Volume

Curtailment of non-military construction was reflected in the November, 1941 record of contracts awarded, according to F. W. Dodge Corporation. November's contract total for the 37 eastern states amounted to $458,620,000, a decrease of 24 per cent from the October figure, but, on the other hand, an increase of 21 per cent over November, 1940. Part of the decline from October, however, is explained by the fact that the number of business days in November was fewer by four than the number in October.

Non-residential building contracts in November ran 30 per cent ahead of the corresponding month of 1940; residential building ran 24 per cent behind; public works and utilities ran 89 per cent ahead.

Construction contracts awarded during the first eleven months of 1941 reached a total of $5,575,848,000, an increase of 57 per cent over the corresponding period of 1940.

Commenting on the construction situation, Thomas S. Holden, president of F. W. Dodge Corporation, stated: "Defense construction programs are being stepped up considerably beyond estimates made in mid-November by governmental and private agencies. Enlarged programs are being formulated for Army, Navy and air corps and for military plant expansion. Record-breaking military plant expansion, seven-day three-shift war effort production, and unemployment in non-military areas are likely to cause greater migration of workers to military areas than we have yet seen, tending to intensify housing shortages and housing needs. The coming year's construction volume is therefore apt to be considerably larger than appeared likely a few weeks ago. Even with non-military activity pared to a minimum, total construction expenditures next year may not lag far behind the post-depression record volume of 1941."

"Moles" to Present Achievement Awards

M. J. Madigan of the engineering firm of Madigan-Hylan and Edmund A. Prentis of Spencer, White & Prentis will receive the 1942 annual award of The Moles for outstanding achievement in the heavy construction field. The Moles are a New York organization composed of men now or formerly engaged in the construction of tunnel, subway, sewer, foundation, marine, subaqueous or other heavy construction work.

According to an announcement by Alex M. Stagg of Jersey City, New Jersey, president of The Moles, these men will receive their formal award on February 4, at a dinner meeting of the organization.

For the past year Mr. Madigan has served as special advisor to Hon. Robert P. Patterson, assistant secretary of war, on matters relating to construction of Army bases, camps, factories, airports and other defense construction.

• Virginia's Shenandoah, South Fork, River Bridge is the longest of three structures that were recently completed as one project by George F. Hazelwood Company of Cumberland, Maryland, at a contract price of $1,137,035.

Mr. Madigan is a member of the American Society of Civil Engineers, American Institute of Consulting Engineers and the Engineers Club.

Major projects on which the firm of Madigan-Hylan have handled major portions of the preparation of plans or supervision of construction or both include the: West Side Elevated Highway, Henry Hudson Parkway, Marine and Cross Bay Parkways, Bronx-Whitestone Bridge, Belt Parkway and Gowanus Elevated Parkway.

Mr. Prentis' company, Spencer White & Prentis, have long specialized in foundations and underpinning and have completed more than 800 foundation contracts, some of the larger ones being the Book-Cadillac Hotel, Detroit, Michigan; Cleveland Union Terminal Building, Cleveland, Ohio; New Statler Hotel, Washington, D. C.; New Criminal Courts Building, the 70-story Bank of Manhattan Building, and a 16-story naval warehouse, all in New York City.

The firm built five dams and locks on the Upper Mississippi and constructed five sections of the New York subways. They are now engaged, with other contractors, on the Delaware Aqueduct section which passes under the Hudson River; and on construction of two drydocks at the Philadelphia Navy Yard and one at Norfolk, Virginia, which will be among the world's largest.

• One of Vermont's major highway projects for '41 was this section of U. S. 5 in the Town of Rockingham. The $137,211 contract calling for 2.4 miles of road modernization was held by The Lane Construction Company of Meriden, Connecticut.

Lime Production for 1940

More than one-fifth of all the lime produced in 1940 in the United States was used in the building industries for mortar, cement, plaster and concrete, according to a survey made by the Bureau of Mines, Department of the Interior, which disclosed that lime is one of the most important commodities in the nonmetallic mineral group because of low cost and wide use. Little or no substitute for lime is possible in certain of its uses, the bureau report stated, and lime tends to replace other products rather than to be replaced by them, thus occupying a favorable place in industry.

The production of lime in this country provided a $34,000,000 business in 1940, according to data gathered by the bureau. A total of 4,886,929 short tons of lime were produced in that period in 38 states. Ohio led the list of states with 1,284,877 tons; Pennsylvania was second with 833,038 tons; and Missouri was third with 607,062 tons. The chief raw material for the manufacture of lime is limestone, which is found in practically every state in the Union.

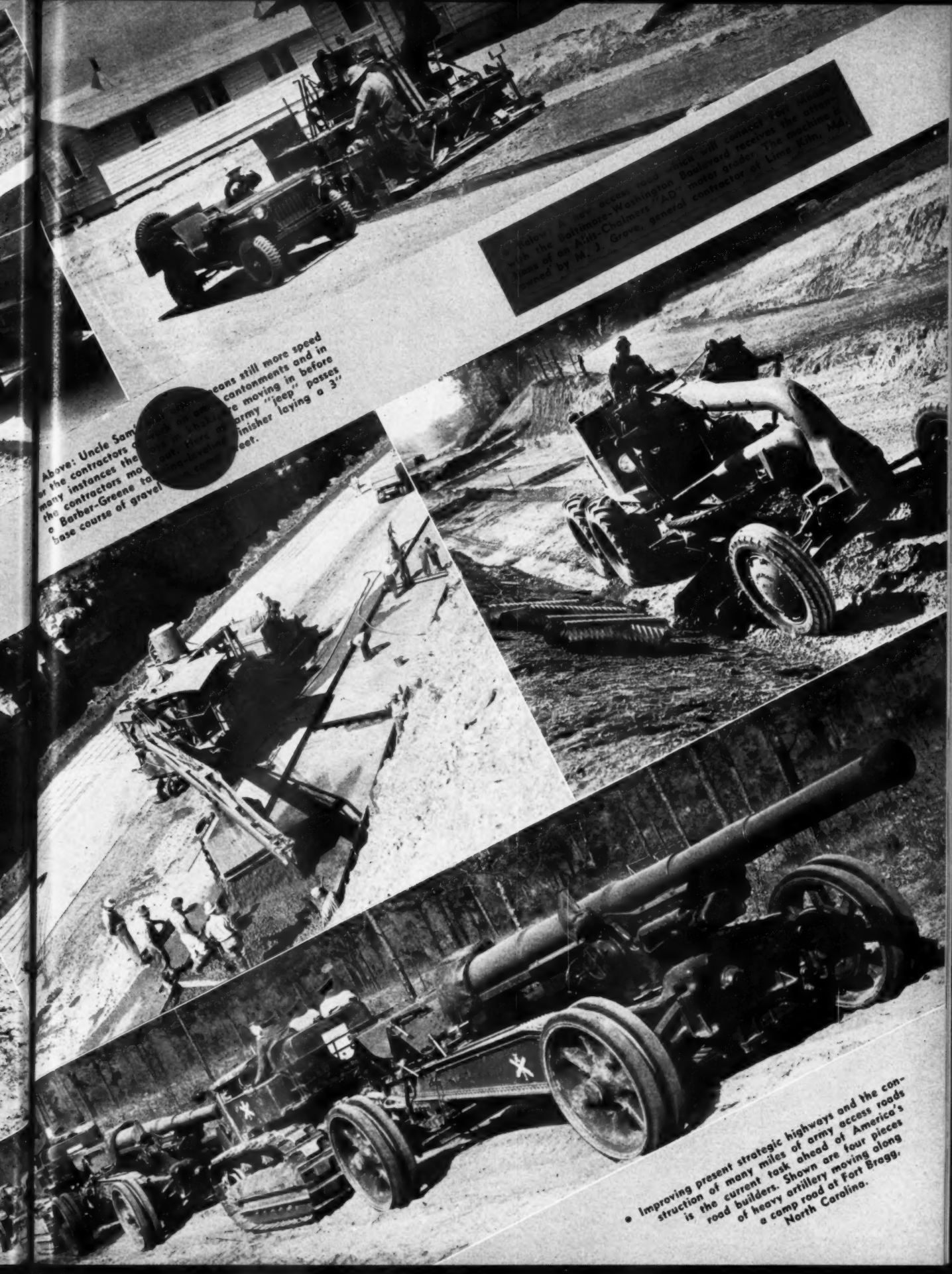
For use in the building industry in 1940, a total of 1,010,435 tons of lime found its way into mortar and cement, while nearly a million tons were used in metallurgical processes such as refining pig iron to make steel and in the concentration of various ore minerals.

As a soil corrective and conditioner and to supply certain plant food elements, the farmers of the United States used 364,823 tons of lime last year, the study revealed.

Building Uncle Sam's Highways of Victory

• Above: Caterpillar [illegible] scraper units handle cut and fill on a [illegible] scale as they move 1,153,000 yards of sand on a [illegible] mile Washington State Highway relocation job near [illegible] Nine miles of Route 117 between Freem[illegible] and Wilso[illegible] North Carolina, are relocated by Beal Br[illegible] aid of two Bucyrus-Erie 4-wheel scrapers [illegible] International TracTracTors.

• Above: Military P[illegible] calls for wider roads. Here E. P. Hunting[illegible] pats his Bucyrus-Erie ⅔-yard shovel to work prep[illegible] for slab widening operations on a Pennsylvania hig[illegible] Below: Concrete for a modern 4-lane highway wit[illegible] a dividing c[illegible] per strip is placed by a Koehring 34E Twin[illegible] batch paver operating 10 miles west of Greensburgh, Penns[illegible] U. S. 30.



Above: Uncle Sam
or the contractors
many instances the
the contractors mo
e Barber-Greene ta
base course of gravel

eans still more speed
cantonments and in
e moving in before
army "jeep" passes
inisher laying a 3"
eet.

with the Baltimore-Washington Boulevard reconstruction project
plans of an Allis-Chalmers "AD" motor grader. The machine is
owned by M. J. Grove, general contractor at Lime Kiln, Md.

• Improving present strategic highways and the construction of many miles of army access roads is the current task ahead of America's road builders. Shown are four pieces of heavy artillery moving along a camp road at Fort Bragg, North Carolina.

• This four lane portion of U. S. 40 running west out of Plainfield is one of Indiana's outstanding highways.

Highway Forecast

(Continued from page 17)

Indiana

Preliminary estimates of Indiana's 1942 road funds indicate that these will total $25,500,000; an increase of approximately $700,000 over the 1941 figures. An estimated $18,000,000 will be spent on construction; maintenance will cost approximately $4,500,000 and other highway department expenditures are expected to total $3,000,000.

Regular Federal Aid is expected to account for about $2,750,000 of the above funds, plus other Federal Aid amounting to approximately $1,250,000. State gas taxes are expected to total $21,500,000.

Tentative plans for 1942 construction call for 91 miles of grading at an estimated cost of $1,280,000. Surfacing will include about 700 miles of oil treatment at $850,000; 130 miles of high type paving at $6,950,000; and 100 miles of low type paving at $3,000,000. Bridge construction costing $4,000,000 and involving 100 structures is also included. All cost figures are estimated.

About 3,000,000 yards of highway excavation, awarded in 1941, will be carried over into 1942. Cost is estimated at $900,000.

Expenditures for equipment purchases during 1941 totalled $278,970.41, and rentals amounted to $75,819.83.

Officials estimate that approximately $10,000,000 of the 1942 construction program will be devoted to military roads.

Iowa

(No information available)

Kansas

An increase of slightly more than 20% over 1941 highway expenditures gives Kansas an estimated $24,327,192 in funds expected to be available for all state roads in 1942. A construction program amounting to $12,750,357 is contemplated, and maintenance is estimated at $4,372,430 for 1942. Other highway department expenditures are expected to total $7,204,405.

Sources of the 1942 funds include $5,622,522 from regular Federal Aid and $3,139,197 from other Federal funds. State gas tax revenues will contribute an estimated $10,589,549, with an additional $4,975,924 to come from vehicle license fees and other state funds.

No definite program for the apportionment of the 1942 funds has been announced. Approximately 6,500,000 yards of highway excavation, costing $1,050,000, will be carried over into 1942 from contracts awarded in 1941.

Equipment purchases during 1941 totalled approximately $250,000 and rental cost amounted to $50,000 for the year.

Officials report that no highway funds were diverted to other uses in Kansas during 1941.

Kentucky

According to preliminary reports, Kentucky will have approximately $22,015,000 available for the state road program in 1942. This includes $11,623,308 for state highway construction, $2,000,000 to counties, $6,500,000 for maintenance and $1,891,692 for other highway department expenditures.

It is expected that these funds will be made available from regular Federal Aid in the amount of $1,804,894, plus other Federal Aid amounting to $1,880,129. State funds include $17,000,000 from state gas taxes and $3,259,000 from vehicle license taxes and other state funds.

In announcing a contemplated construction program which will include 125 miles of high type paving and 300 miles of low type paving, officials stated:

"Under present conditions due to the national emergency, it appears that our highway construction work will be largely one of two factors. First and most important, the elimination of weak bridges and other construction requested by the War Department improving conditions on the strategic network; the second applies undoubtedly to resurfacing and improving types of surface on the highway system where this can be done without the use of critical materials.

"Any new grading work will probably be limited to jobs that can be built without drainage structures larger than pipes. There will probably be a considerable amount of grading work involved in widening shoulders and cuts."

Louisiana

Tentative plans announced by the state department of highways indicates that a total of $30,166,-

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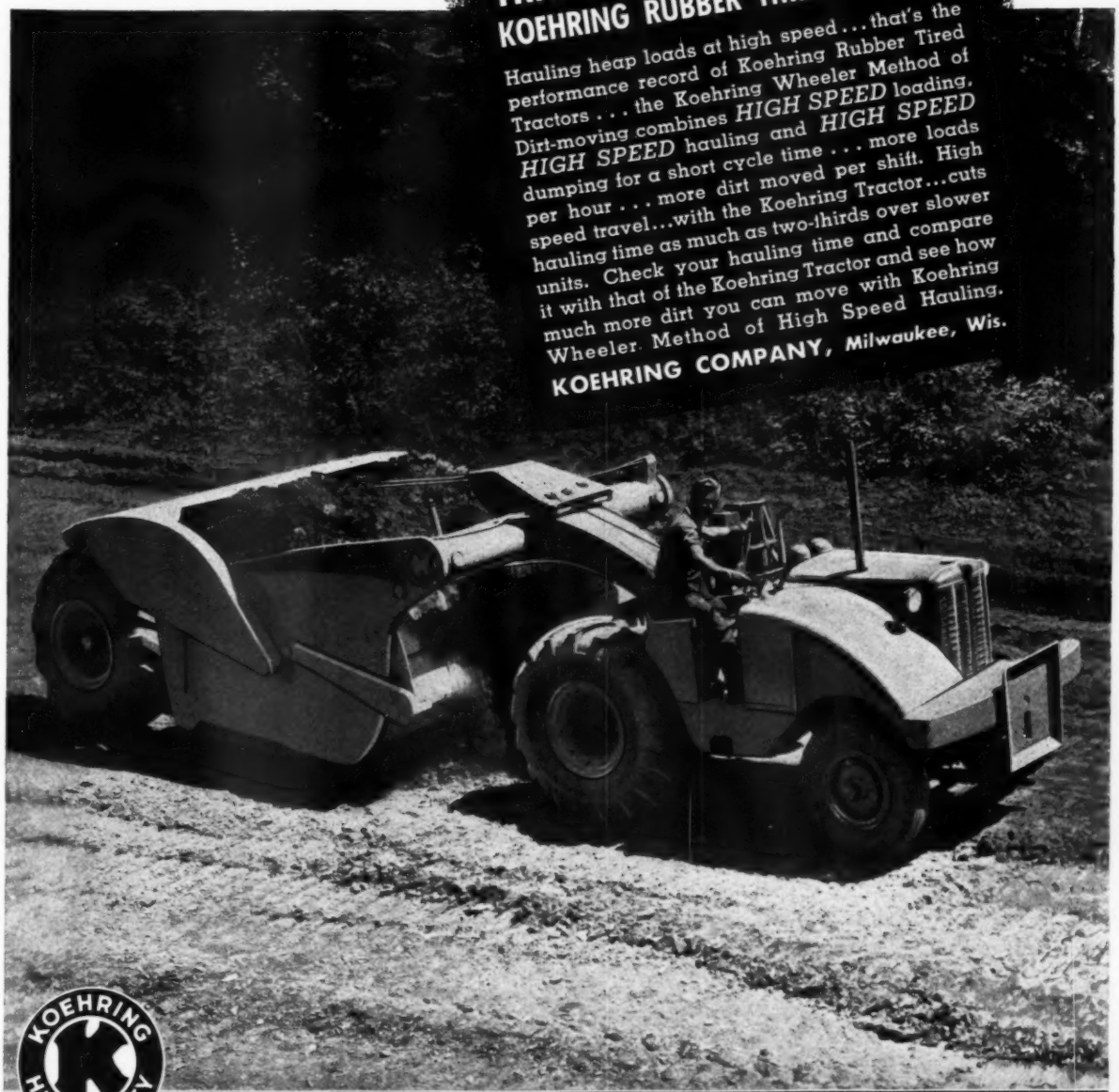
KOEHRING COMPANY, Milwaukee, Wis.



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700 will be available for the 1942 program. Disbursement of this fund will be approximately as follows:

Construction	$17,289,502
Reconditioning	7,100,370
State aid to parishes	1,276,828
Maintenance	4,000,000
Equipment	500,000

Sources of the 1942 funds were listed in the department's report on proposed 1942 plans as:

Federal Aid, regular	$4,889,000
Federal Aid, secondary	608,000
Federal Aid, grade sep.	1,746,700
Flood control	5,000,000
Access funds	2,500,000
W.P.A. Reg.	2,000,000
W.P.A. Access	2,550,000
Forest Highway Funds	58,000
Motor Tax, net (*)	9,300,000*
Bond	1,400,000
Flood relief	115,000

* Bond redemption not included.

Summarizing the proposed 1942 construction, the report lists 35 miles of concrete pavement, 45 miles of bituminous surfacing, 100 miles of aggregate type surfacing, 60 miles of grading, 25 miles of roadside improvements, 20 miles of bituminous pavement, 1,100 miles of reconditioning, and the construction of numerous bridges, overpasses and underpasses.

Expenditures for equipment during 1941 were reported as $800,000.

Maine

With a total of $11,122,000 expected to be available for highways in 1942, Maine intends to spend $5,475,000 on construction and $3,365,000 on maintenance. Other highway department expenditures will total approximately $2,828,000 during the year.

Regular Federal Aid is expected to furnish $1,566,000 of the 1942 funds, while other Federal Aid will account for $200,000. State gas tax funds will total $6,150,000 and the balance of the 1942 funds will be made available from vehicle license fees and other state sources in the total amount of $3,206,000.

Maine's construction program for 1942 has not yet been determined. Some indication is given, however, in the reports on the status of Federal Aid construction. These show that, as of October 31, 1941, Maine had two Federal Aid grade crossing projects under construction to cost an estimated $390,477, with 3 more projects approved for construction, to cost $8,680. Federal Aid secondary road projects included 11.7 miles under construction at $251,758, with 2.2 miles of Federal Aid highway under construction at an estimated total cost of $972,831, with an additional 3.9 miles approved for construction at a total cost of $270,170.

Equipment purchases for 1941 totalled approximately $130,000. No diversion of highway funds was reported.

• A column of field kitchens practices doing without bridges during army maneuvers in Tennessee. (Acme Photo)

Maryland

An increase of approximately $6,652,055 over 1941 expenditures brings the total anticipated funds for Maryland's 1942 program to $22,198,755, exclusive of an estimated $14,000,000 access road program and a further strategic road program as yet unallocated.

Construction, including some work from 1941 and earlier, is estimated at $12,937,201. Maintenance will total $4,261,554, and other highway department expenditures will amount to approximately $5,000,000.

Sources of the 1942 funds are:

Federal funds:	
Regular Federal aid	$ 833,715.00
Other	350,659.00
State funds:	
State gas tax	$10,212,078.23
Vehicle license fees	3,371,708.00
Bond proceeds	3,765,000.00

Included in the 1942 construction program are such items as 127 miles of grading, involving 1,270,000 yards of material, to cost $570,000; 20 miles of gravel or crushed stone surfacing at $270,000; 11 miles of bituminous macadam at $660,000; 75 miles of high type paving at $5,450,000; 20 miles of low type paving at $330,000, and 32 bridges to cost a total of $5,647,000.

Equipment expenditures for 1941 include $280,000 spent for equipment purchases, and $243,243 in rental cost. No highway funds were diverted to other uses during the year.

Massachusetts

Anticipating a total of $18,082,400 available for the 1942 road program, state highway officials estimate that approximately $10,000,000 will be available for construction on state highways and Federal projects, with an estimated $3,572,500 to be spent on maintenance. 1942 funds as reported represent an increase of $6,400,000 over 1941 expenditures.

Principal source of the 1942 funds will be state gas taxes, which will contribute an estimated $11,182,400; regular Federal Aid will amount to approximately $3,700,000 and an additional $3,200,000 in other Federal Aid is anticipated.

Construction contracts on Federal projects for 1942 will include

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CALIFORNIA, LOS ANGELES: Crook Company, 2900 Santa Fe Avenue. Phone Kimball 5137.
*SAN FRANCISCO: Bucyrus-Erie Company, 399 Bayshore Blvd. Phone Atwater 2341.
COLORADO, DENVER: Ray Corson Machinery Co., 1646 Wazee Street. Phone Keystone 6632.
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DISTRICT OF COLUMBIA, WASHINGTON: Bucyrus-Erie Co., Room 920 Tower Bldg. Phone National 7148—7660.
FLORIDA, JACKSONVILLE: Quinn R. Barton, Inc., 1305 W. Forsyth St. Phone 3-1145.
MIAMI: East Coast Equip. Co., Inc., 1228 S. West First St. Phone 3-5433.
MULBERRY: Mulberry Supply Co. Phone 51.
*GEORGIA, ATLANTA: Bucyrus-Erie Co., 1508 William-Oliver Bldg. Phone Jackson 1545.
ATLANTA: R. S. Armstrong & Bro. Co., 676 Marietta St. N. W. Phone Jackson 2010.
IDAHO, BOISE: The Intermountain Equipment Co., Broadway at Myrtle St. Phone 171.
ILLINOIS, CHICAGO: Bucyrus-Monighan Co., 931 Kilpatrick Ave. Phone Marsfield 3210.
*CHICAGO: Bucyrus-Erie Company, 1312 Bankers Bldg., 105 W. Adams Street. Phone Franklin 5321.
CHICAGO: Great Lakes Supply Corp., 1026 West 50th St. Phone Atlantic 6622.
INDIANA, EVANSVILLE: Bucyrus-Erie Co., P. O. Box 479. Phone 2-1111.
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DULUTH: Wm. H. Ziegler Co., Inc., 304 Lake Ave., So. Phone Melrose 681.
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MISSISSIPPI, JACKSON: Mississippi Road Supply Co., Mill & Keener Sts. Telephones: Long Distance 6; Local 4-4724.
*MISSOURI, KANSAS CITY: Bucyrus-Erie Company, 1007 Fairfax Bldg. Phone Harrison 4811.
*ST. LOUIS: Bucyrus-Erie Company, 813 Olive St.—Suite 908. Telephone Chestnut 1354.
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MONTANA, BILLINGS: J. D. Adams Co., 2313 First North. Phone 3201.
MISSOULA: Westmont Tractor & Equip. Co., 150 E. Spruce St. Phone 2664.
NEBRASKA, OMAHA: Cardinal Supply & Mfg. Co., Sunderland Bldg. Phone Atlantic 1155.
OMAHA: Fuchs Mchy. & Supply Co., 1102 Farnam Street. Phone Atlantic 7050.
*NEW JERSEY, ENGLEWOOD: Bucyrus-Erie Company, 214-216 South Dean Street. Phone 3-0727.
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*SYRACUSE: Bucyrus-Erie Company, 303 Draper Ave. Phone 6-1078.
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CLEVELAND: W. T. Walsh Equipment Co., 3088 W. 106th St. Phone Clearwater 4400.
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OREGON, PORTLAND: Clyde Equipment Co., 17th & Thurman Streets. Phone Broadway 5561.
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*PITTSBURGH: Bucyrus-Erie Co., 1705 Clark Bldg. Phone Atlantic 4815.
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TENNESSEE, KNOXVILLE: Brooks Equipment & Mfg. Co., 408-10 Davenport Rd. Phone 3-7135.
MEMPHIS: Road Builders Equipment Co., Third and Calhoun Sts. Phone 6-6470.
TEXAS, DALLAS: Bucyrus-Erie Co., 1806 Tower Petroleum Bldg. Phone Central 2943.
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AMARILLO: R. B. George Tractor & Machy. Co. Phone 6185.
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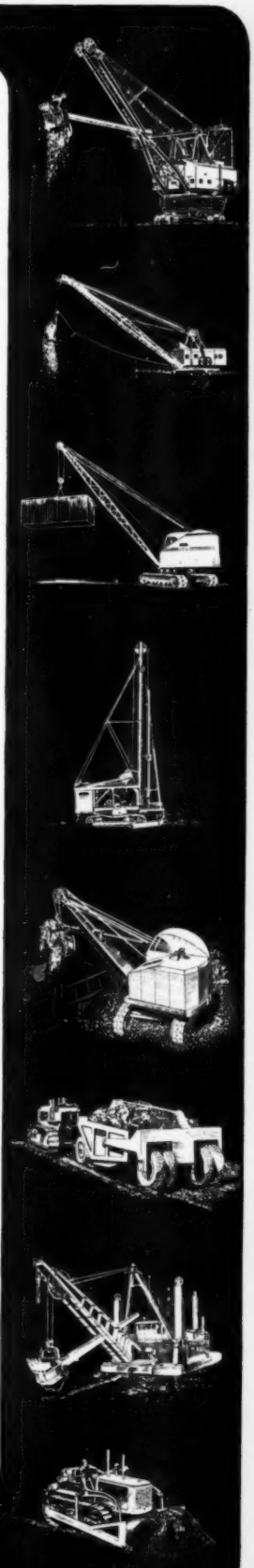
VERMONT, BARRE: Reynolds & Son, Inc., Phones 334—335.
VIRGINIA, RICHMOND: Virginia Tractor Co., Inc., 1028 W. Main St. Phone 5-9138.
ROANOKE: Virginia Tractor Co., 515 Norfolk Ave., S.W. Phone 2-3496.
WASHINGTON, SEATTLE: Clyde Equipment Co., 3410 First Ave. South. Phone Main 1235.
*SEATTLE: Bucyrus-Erie Co., 3408 First Ave., So. Phone Main 6424.
SEATTLE (for Alaska): Northern Commercial Co., 419 Colman Bldg. Phone El. 8830.
SPOKANE: Construction Equipment Co., 1118 Ide Ave. Phone Broadway 5076.
WEST VIRGINIA, CLARKSBURG: General Equip. Co., Inc., 414 N. Fourth St. Phone 3198.
HUNTINGTON: Chas. S. Porter Supply Co., 424 Fourth Ave. Phone 2-6651.
WISCONSIN: MILWAUKEE: W. L. Hartley, 2552 N. 89th St., Wauwatosa, Wis. Phone Bluemound 7131.
SOUTH MILWAUKEE: Bucyrus-Erie Co. Phone 900.

Canada

BRITISH COLUMBIA, VANCOUVER: Finning Tractor and Equip. Co., 940 Station St. Phone Seymour 7895.
MANITOBA: WINNIPEG: Kipp-Kelly, Ltd., 68 Higgins Ave. Phones 8-9507—9-2508.
NEWFOUNDLAND, ST. JOHN'S: Newfoundland Tractor & Equip. Co., Ltd. Phone 1797.
ONTARIO, TORONTO: F. H. Hopkins & Co., Ltd., Commerce & Transportation Building. Phone Elgin 4094.
QUEBEC, MONTREAL: F. H. Hopkins & Co., Ltd., 340 Canada Cement Bldg., Phillips Square. Phone Plateau 1136.



Bucyrus-Erie

GENERAL OFFICES: SOUTH MILWAUKEE WISCONSIN, U. S. A.

43 miles of high type paving, estimated at $5,300,000; 8 miles of low type paving at approximately $300,000 and 30 bridges costing an estimated $1,800,000.

Of the 1942 state highway and Federal Aid construction funds, approximately 95% will be used for military roads, officials estimate.

About $500,000 in highway excavation and borrow of all types, involving 1,000,000 yards of material, will be carried over into 1942 from previous awards.

Expenditures for equipment during 1941 were approximately $131,000 for purchases and $224,000 for rental costs.

No diversion of highway funds was reported.

Michigan

Reporting that under present conditions it is impossible to forecast the extent of Michigan's 1942 construction program, H. C. Coons, deputy commissioner-chief engineer, states that expenditures for regular maintenance and the purchase of maintenance equipment will closely approximate those of 1941.

Some indication of Michigan's forthcoming program is given in Mr. Coon's letter, which states:

"State highway commissioner G. Donald Kennedy has issued an 'all out' concentration on surveys, plant and construction projects which are certified as vital to the National Defense by the Secretary of War, and design departments are now on an overtime production basis. Our major military reservation access road project is at Fort Custer where $800,000 of concrete pavement, grade separation and bridge construction remains to be completed.

"According to late reports Michigan is a high ranking State in the volume of defense orders placed with its industrial plants. It is now expected that orders placed through 1942 will exceed three billion dollars. This means that access roads are needed particularly where new plants are being developed in open rural areas. In view of the fact that the automobile plants and allied industries are actively engaged in this type of work, the bulk of access road building will be in the Detroit area. The volume of this work cannot be estimated at the present time and will only be determined by certification of the Secretary of War. The type of work will consist of concrete pavement, grade separations and bridges.

"For 'fill in' work, projects will be undertaken with regular Federal-aid and State funds which do not require the use of critical or scarce materials. The types of work in this section of our program will consist of grading and drainage and the construction of structures with substitute materials."

• A LaPlant-Choate scraper takes a heaping load during the rebuilding of 4.6 miles of Iowa's Route 14. J. D. Armstrong Company of Ames moved 200,000 yards on this job.

During 1941, Michigan spent $15,785,479 on construction, which included 68 miles of gravel or crushed stone surfacing, 70 miles of high type paving, 160 miles of low type paving, 46 bridges and 7 grade crossing separations. Maintenance costs totalled $6,892,000.

Equipment purchases by the state amounted to $250,000 in 1941.

Approximately 60% of the 1941 funds were derived from state gas taxes, with regular Federal Aid accounting for approximately 35% and other Federal Aid contributing 5%.

Diversion of highway funds to other uses is prohibited by constitutional amendment in Michigan.

Minnesota

Aside from estimating the 1942 maintenance expenditures at approximately $7,000,000, Minnesota highway department officials were unable to cite figures on the state's 1942 program.

Expected revenues for the 1942 program include approximately $3,709,000 from regular Federal Aid, $12,650,000 from state gas taxes and another $10,500,000 from vehicle license fees and other state funds.

Highway excavation awarded in 1941 which will be carried into 1942 for completion involves 4,980,000 yards at an estimated cost of $697,200.

According to reports on the status of various Federal Aid projects in Minnesota as of October 31, 1941, the state had 10 grade crossing projects under construction totalling an estimated $1,026,634, and 8 more were approved for construction at a cost of approximately $270,324. Secondary or feeder road projects to cost $1,562,365 and covering 171.8 miles were under construction, and 48.8 additional miles were approved for construction at approximately $539,972. There were also 410.1 miles of Federal Aid highways under construction, with total cost estimated at $9,765,382,

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PRIMACORD-BICKFORD DETONATING FUSE

For your convenience in writing to The Ensign Bickford Co., you will find a card bound in this issue.

• West Virginia's U. S. 60 on the east side of Charleston was recently transformed into this modern 4-lane highway.

and 58.7 additional miles approved for construction, estimated at $1,363,844.

Equipment purchases by the state amounted to about $700,000; rental costs totalled $278,467.83.

Mississippi

R. A. Harris, chief engineer, reports that an estimate of funds available for Mississippi's 1942 road program awaits action by the state legislature, which will convene in January.

According to reports on the status of Federal Aid projects in Mississippi as of October 31, 1941, the state had 308.9 miles of Federal Aid highway under construction, at an estimated cost of $5,549,952 with an additional 32.5 miles, to cost $659,300, approved for construction. There were also 49.7 miles of secondary or feeder roads under construction, estimated at $1,012,161, and 45.2 miles approved for construction at $1,008,600. In grade crossing projects, the state had 10 under construction at $811,084, and had 12 more approved for construction, to cost $98,708.

Highway excavation awarded in 1941 but carried over into 1942 for completion amounted to $454,027 and involved 1,928,733 yards.

During 1941, the state spent approximately $250,000 on equipment purchases and $5,000 on rentals. No highway funds were diverted during the year.

Missouri

C. W. Brown, chief engineer of the Missouri State Highway Department, reports that an estimated $13,500,000 will be spent on construction during 1942. The estimated construction program for 1942 is as follows:

1942 Estimated Program

	Miles	Amount
Concrete pavement	165	$10,280,000
Bituminous surface	50	870,000
Oil-aggregate surface	620	750,000
Granular surface	200	1,100,000
Graded earth	40	500,000
Total	1,075	$13,500,000

Missouri is operating on a pay-as-you-go plan, and the state revenue for 1941 will be about $1,500,000 more than for 1940. Sufficient funds have been available to match all federal allotments. Heavy bond requirements and a maintenance allotment of approximately $6,500,000 have been taken care of and the Department goes into the year 1942 in a satisfactory financial condition. Receipts from state sources, principally gas tax and license fees, for 1942, will be estimated at the actual income for 1941, although officials believe that the restriction in the manufacture of automobiles and the possibility of a reduction in the gas tax collections will have to be taken into account.

The regular federal aid for 1942 remains at about the same figure as for 1941, and the additional federal aid for Missouri is not definitely known at this time. Officials are confident that the Missouri Department will be able to provide all funds necessary for the matching of any federal allotment likely to be made to the State and that all roads vitally necessary for national defense, and suggested by the federal government, can be constructed in due time.

Mr. Brown states that during 1941 the Missouri State Highway Commission used its construction funds for the most part in the modernization by reconstruction and other improvement of the existing state highway system, and for the extension of the farm-to-market roads. Much of this work was made up of converting the lower traffic gravel roads into roads of dustless surface, and the construction and improvement of the roads of the state which carry the high traffic volumes. Most of the roads in the last category are those that have an importance as military roads and are otherwise considered strategically important to the national defense.

Contracts Let in 1941

	Miles	Amount
Concrete pavement	133.1	$8,070,000
Bituminous surface	77.6	1,262,000
Oil-aggregate surface	568.0	652,000
Granular surface	205.7	1,667,000
Graded earth	45.8	555,000
Misc. construction		383,000
Total	1,030.2	$12,589,000

1941 Grade Separations

6 Projects—2.8 miles, $735,000;
6 Bridges—$373,000.
(These projects included in 1941 contracts listed above.)

Montana

A total of $10,135,000 is expected to be available for Montana's 1942 road program, which represents an increase of nearly 10% over 1941 expenditures. Estimated construction will require approximately $6,000,000 of 1942 funds, maintenance is expected to cost $3,210,000 and other highway department expenditures will account for the remaining $925,000.

Anticipated 1942 revenues include $4,615,000 from regular Federal Aid, $5,500,000 from state gas tax funds and $20,000 from other state funds.

Included in the 1942 estimate of construction are 200 miles of grading, involving 8,000,000 yards of material and estimated to cost $2,300,000; 200 miles of gravel or

29 NORTHWESTS

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• Picturesque is the word for this section of New Hampshire's Franklin-Hill-Bristol road project. The road is 22 feet in width and has a roadmix bituminous surface.

crushed stone surfacing requiring 2,350,000 tons of aggregate at an estimated total cost of $2,200,000; 130 miles of oil treatment to cost $700,000 and 50 bridges to cost approximately $8,000,000. Officials report that about $5,000,000 of this construction will be for military roads.

In addition to the above construction program, work on 1941 awards totalling $585,000 and involving 2,700,000 yards of highway excavation, will be carried over into 1942.

Montana's equipment purchases totalled approximately $160,000 during 1941, and rental cost amounted to $57,000. No diversion of state highway funds was reported.

Nebraska

Wardner G. Scott, state engineer wires the following information on Nebraska's 1941 activities:

SUMMARY 1941 WORK AS FOLLOWS: 222 MILES GRADING, 173 MILES GRAVEL, 170 MILES BITUMINOUS SURFACING, 24 MILES CONCRETE PAVEMENT, 81 BRIDGES, 7 RAILROAD GRADE SEPARATIONS, 5 TRAFFIC SIGNAL INSTALLATIONS, 9 RAILROAD CROSSING SIGNAL INSTALLATIONS. TOTAL ESTIMATED COST $6,500,000.

Nevada

Definite estimation of funds available for Nevada's roads in 1942 awaits complete information as to the apportionment of Federal funds under the War Defense act recently passed by Congress.

Assuming, however, that these funds will be apportioned in accordance with the regular Federal Aid authorization, highway officials estimate that a total of $4,217,000 will be available. This amount would be programmed to include $2,502,000 in construction, $900,000 in maintenance and $815,000 for other highway department expenditures, including engineering surveys and plans, equipment purchases, administration and the like.

State funds would provide a total of $2,300,000 made up of $1,625,000 in state gas tax revenues and $675,000 in vehicle license fees and other state funds. Federal Aid funds are difficult to forecast, but officials expect $1,597,000 in regular Federal Aid allocations and $320,000 for strategic network construction and improvement.

No details as to 1942 construction are available, except that all proposed construction is to be confined to strategic network roads, according to the highway department.

Nevada's legislature passed an amendment to the state constitution during the 1940-41 session which prohibits the diversion of highway funds.

Equipment purchased by the state for maintenance work cost a total of $314,000 during 1941.

New Hampshire

With an anticipated $7,434,576 available for 1942, New Hampshire expects to spend $2,280,000 on construction and $3,753,126 on maintenance, leaving $1,401,450 for other highway department expenditures, according to L. E. Everett, commissioner.

Sources of the 1942 funds are regular Federal Aid amounting to $800,000; state gas tax revenue totalling $2,900,000, and other state funds in the amount of $2,700,000.

Commissioner Everett states that the 1942 construction funds will be used as follows:

	Miles	Amount
Gravel or crushed stone surfacing	10	$ 80,000
Oil treatment	50	750,000
Paving, high type	15	900,000
Paving, low type	10	400,000
Bridges (number)	15	150,000

Approximately $1,443,000 of the 1942 construction is estimated to be for military roads.

No highway funds were diverted to other uses in New Hampshire during 1941.

New Jersey

Information as to New Jersey's highway plans for 1942 is unobtainable at the present time.

In the quarterly report of the state highway department issued on October 1, 1941, estimated revenue for 1941 was listed as follows:

Unappropriated balance	$ 800,000.00
Motor vehicle fees, fines, etc.	22,176,000.00
Motor vehicle inspection fees	1,000,000.00
Tax on motor fuels	24,700,000.00
Bus excise taxes	100,000.00
Federal aid	1,553,000.00
Miscellaneous revenue	300,000.00
Total estimated revenue	$50,629,000.00

Estimated expenditures for 1941, as given in the same report, included $5,799,289.72 for road construction on the state highway system, $1,721,270.05 on bridge and grade crossing contracts, and $6,374,447.12 for purchase of right of way. These were the main items in the state highway construction fund, which totalled $18,398,681.78.

New Mexico

In reporting a total of $13,043,260 in funds available for the 1942

IN THESE TIMES
LET'S FACE the FACTS with COMMON SENSE

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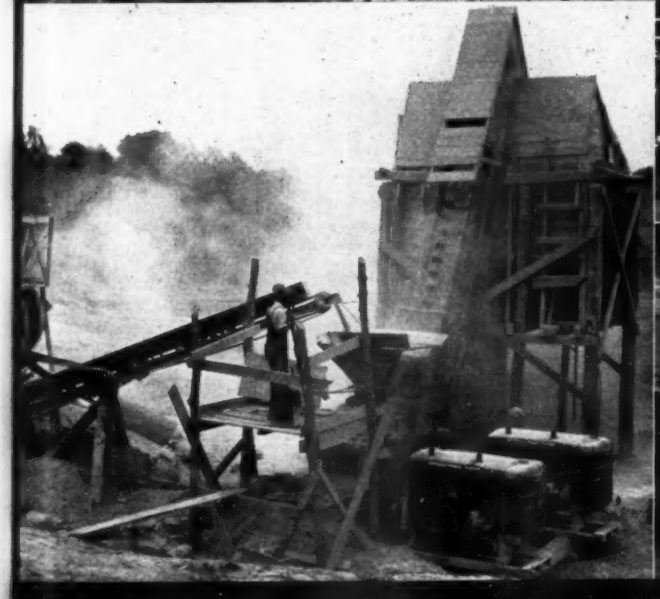
Below: Putting a new angle on a road grade at low cost with an International Diesel-powered grader. *Bottom:* Two International UD-18 Diesel Power Units operating lime crushing outfit.



International Industrial Power dealers take pride in neat, orderly parts departments and in their used tractors, thoroughly reconditioned and ready to go to work.

INTERNATIONAL Industrial Power

FEDERAL AID GRADE CROSSING PROJECTS

AS OF OCTOBER 31, 1941

STATE	COMPLETED DURING CURRENT FISCAL YEAR					UNDER CONSTRUCTION					APPROVED FOR CONSTRUCTION					BALANCE OF FUNDS AVAILABLE FOR PROGRAMMED PROJECTS
			NUMBER					NUMBER					NUMBER			
	Estimated Total Cost	Federal Aid	Grade Crossings Eliminated by Separation or Relocation	Grade Crossing Structures Reconstructed	Grade Crossings Protected by Signals or Otherwise	Estimated Total Cost	Federal Aid	Grade Crossings Eliminated by Separation or Relocation	Grade Crossing Structures Reconstructed	Grade Crossings Protected by Signals or Otherwise	Estimated Total Cost	Federal Aid	Grade Crossings Eliminated by Separation or Relocation	Grade Crossing Structures Reconstructed	Grade Crossings Protected by Signals or Otherwise	
Alabama	$ 5,739	$ 5,739			2	$ 421,822	$ 419,800	6	5	1	$ 154,235	$ 154,235	3	1	6	$ 729,700
Arizona						309,635	300,944	1	2		13,255	13,255			2	92,976
Arkansas	107,311	107,256			1	511,114	509,130	6			33,786	33,786			11	313,381
California	376,504	190,789	1		1	1,315,838	1,309,865	9	1		20,630	20,630			7	1,501,452
Colorado	5,685	5,646				590,186	590,186	6			21,042	21,042			10	547,822
Connecticut	166,222	165,415	2			61,712	60,676		1		231,374	222,740		1		352,566
Delaware	4,380	4,380			1	94,135	94,135	1			692,694	504,341	3	1		73,707
Florida	33,447	33,447			6	767,560	762,376	8		14	203,082	203,021			19	610,361
Georgia	403,084	403,084	6	1	1	978,537	978,537	6	6	1	934,287	934,287	2	5	27	1,141,222
Idaho	11,301	11,301				302,225	293,553	3	1		34,621	34,621	1		4	262,324
Illinois	187,801	148,267			73	2,161,884	1,978,650	10	1	8	420,414	401,664	1	1	35	1,531,566
Indiana	173,001	173,001	1		8	775,513	763,026	6	1	10	234,376	228,667	1		44	644,992
Iowa	213,010	203,589	2	1	5	1,267,169	1,019,232	10	2	10	495,404	485,475	1		70	120,383
Kansas	34,334	34,229	1		2	569,456	569,456	8			348,854	304,969	5		14	874,766
Kentucky	163,064	161,519	2		1	1,075,361	1,069,248	8	1		319,265	319,265	3			48,565
Louisiana						588,415	588,415	8			473,319	472,152	4		2	610,118
Maine						390,447	390,447	2			8,680	8,680			3	109,934
Maryland	481,550	449,757	2	2	8	330,159	330,159	2		1	590,703	446,905	2		13	205,511
Massachusetts						1,120,671	1,109,293	6	2		763,830	763,830	2	1		878,999
Michigan	394,700	394,700		1	5	972,739	972,739	3	3	3	527,954	497,793	2		27	667,292
Minnesota	338,950	338,635	2	3	1	1,026,634	1,026,634	7	3		270,324	270,324	1	3	4	697,343
Mississippi	202,300	202,300	2		1	811,084	811,084	9	1		98,708	98,708	1		11	327,264
Missouri	55,240	55,240		1		1,979,682	1,524,262	6	3		330,551	223,526	1	2		1,147,479
Montana	56,726	56,726	1			174,019	174,019	2			6,645	6,645			2	474,600
Nebraska	142,718	142,714		1	12	1,187,289	1,187,289	23		6	26,502	26,502			7	116,137
Nevada	119,580	119,580	2			56,484	56,484	2			21,703	21,703			7	103,916
New Hampshire	63,682	62,862	2			306,045	305,745	4	2		9,464	9,464			4	194,348
New Jersey	214,360	214,360	2			1,254,863	1,129,314	5	2	1	354,985	295,560	1	2		554,080
New Mexico						68,342	68,342	1			259,103	252,068	3		1	338,650
New York	1,345,993	1,318,867		8		2,812,436	2,763,787	5	11		750,945	613,285		3		2,420,776
North Carolina	412,365	412,365	2	4	17	256,906	254,028		3	4	251,793	251,793	3		24	782,113
North Dakota	80,242	79,789	2			697,230	684,293	8			223,120	223,120	2			336,428
Ohio	324,301	323,904	1	1	1	3,457,893	3,376,850	15		4	541,407	282,350	2		7	1,049,956
Oklahoma	128,076	124,660	1		17	849,622	846,212	6		3	412,316	354,274	3		18	1,123,686
Oregon	302,166	278,255	3		2	125,127	84,757	2			4,733	4,733			3	391,816
Pennsylvania	873,683	873,355	7	1		3,243,392	3,203,414	17			1,147,255	1,142,789	6			1,330,260
Rhode Island	205,241	205,241		1		3,655	3,655									176,421
South Carolina	169,540	166,310	2		10	342,678	330,278	5	3	5	300,248	166,574	1	2	16	691,260
South Dakota	348,243	348,243	10		2	677,142	661,192	12		7	41,200	41,200	2			577,780
Tennessee	225,916	216,452	1	3		1,176,346	1,176,346	8			102,106	102,106		1	2	845,415
Texas	717,706	708,673	8			1,716,525	1,708,791	17			156,650	148,350	3		5	1,371,886
Utah	42,014	41,272	2		13	77,264	77,264	1		12	69,025	69,025			26	226,082
Vermont	9,723	9,711			2	331,830	302,051	2		2						4,381
Virginia	92,292	92,292		2		718,013	717,553	5	3		106,935	87,435	2		5	568,313
Washington	55,443	55,443		1	1	333,418	333,418	3	1		12,151	12,151			4	453,333
West Virginia	10,640	10,640			4	807,142	801,522	9	1	2	93,190	93,190			3	510,406
Wisconsin	156,539	128,261	1		14	840,100	838,394	4	2	21	61,692	61,692			13	1,159,125
Wyoming	477,151	477,150	5			4,929	4,929				8,199	8,199			6	286,556
District of Columbia	2,193	2,193				1,462	1,462				298,213	273,744		1		5,851
Hawaii	192,574	192,566	2			214,170	213,655	2								180,308
Puerto Rico	103,629	102,980	1			639,340	632,516	9			150,994	149,890	2			188,708
TOTALS	10,230,359	9,853,158	76	31	211	40,735,640	39,409,407	298	61	115	12,631,962	11,361,758	63	24	462	29,952,314

program, New Mexico highway department officials point out that uncertainty as to the status of Federal Aid funds gives no assurance that the program can be completed as planned.

New Mexico's 1942 state highway expenditures are tentatively estimated as follows:

Construction	$9,118,058.04
Maintenance	2,398,184.56
Administration	373,403.00
Other	
Construction engineering	510,922.97
Location engineering	342,692.00
Equipment, property purchases, repairs and miscellaneous	300,000.00
Total 1942 funds	$13,043,260.57

Sources of the above funds are reported as follows:

State gasoline tax	$ 2,834,913.34
State motor vehicle tax	903,000.00
Other state funds	42,500.00
Federal aid (primary)	2,815,406.31
Federal aid (secondary)	388,450.17
Federal aid (grade crossing)	711,526.28
Federal aid (other)	2,045,230.20
Sale of debentures	2,000,000.00
Cash balance	1,302,234.27
Total	$13,043,260.57

Maintenance operations during 1942 are expected to cost $60,000 for snow removal, $175,000 for equipment purchases, $60,000 for minor betterments and $131,200 for road signs and center striping. Improvements to the state highway system in 1942 will include 150 miles of grading, draining and gravel surfacing and 175 miles of double penetration bituminous surfacing.

Contracts underway in 1941, to be completed in 1942, include 1,532,858 yards of highway excavation at a contract price of $315,844.20.

No diversion of highway funds to other uses was reported.

New York

Appropriations for the state's 1942 highway program await action by the state legislature which does not convene until late this month.

Some indication of highway activity may be gained, however, by the fact that at the end of October, 1941, the state had 145 miles of roads under construction at a total contract price of $18,405,000.

Federal Aid projects in the state, reported as of October 31, 1941, included 16 grade crossing projects under construction at an

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estimated total cost of $2,812,436, plus 3 more approved for construction to cost $740,945. There were 21.3 miles of secondary or feeder roads under construction, costing $1,053,146, and an additional 1.0 miles approved for construction at $75,000. Federal Aid highway projects involved 123.4 miles under construction, to cost an estimated $10,931,119, with another 8.4 miles approved for construction at $862,200.

Voters of New York state, at the November 4, 1941 elections made $30,000,000 available for highway and $30,000,000 for parkway construction, effective January 1, 1942. Highway department officials indicate, however, that the war emergency and the question of priorities has complicated the formulation of definite plans for 1942.

North Carolina

Forecasting an estimated $22,000,000 fund available for 1942 road programs for the state, North Carolina highway department officials list tentative figures showing $10,000,000 available for construction and $12,000,000 for maintenance. Regular Federal Aid is expected to total approximately $4,000,000 and state funds including gas tax revenues are estimated at $18,000,000.

Proposed construction for 1942 includes the following work at the estimated costs shown:

	Miles	Cost
Grading	50	$ 700,000
Grading and surfacing with gravel, crushed stone, or oil treatment	200	2,450,000
Grading and paving, high type	175	4,100,000
Grading and paving, low type	75	750,000
Bridges and culverts, (number)	30	2,000,000

North Carolina's expenditures for equipment purchases during 1941 were reported at approximately $900,000.

North Dakota

No definite plans for the state's 1942 road program have been announced because policies for highway department operation under wartime conditions have not as yet been formulated, officials report.

During 1941, North Dakota spent a total of $6,190,781 on its highway program, which included $4,159,746 for construction, $1,758,995 for maintenance (including $174,000 for equipment), and $272,040 for other highway department expenditures.

Regular Federal Aid for 1941 totalled $2,130,275, and other Federal Aid amounted to $572,000. State funds included $2,594,636 from state gas taxes plus $821,013 from vehicle license fees and other state funds.

Construction during 1941 involved 251 miles of grading, 2 miles of high type paving, 210 miles of low type paving, 9 bridges, and 2 grade crossing separations. 500,000 yards of highway excavation awarded in 1941 will be carried over into 1942.

No highway funds were diverted to other uses in 1941.

Ohio

Funds expected to be available for Ohio's roads in 1942 total $40,315,000, representing an increase of approximately 12½% over 1941 highway expenditures. $30,315,000 of the 1942 funds will be devoted to construction and $10,000,000 to maintenance.

Sources of 1942 funds include regular Federal Aid in the amount of $4,935,000 and other Federal Aid totalling $15,880,000. State gas tax funds will contribute $15,300,000 and other state funds will make up the $4,200,000 balance.

Planned construction for 1942 includes 370 miles of grading (included with paving contracts) requiring 15,500,000 yards of excavation at an estimated cost of $6,200,000. Approximately 150 miles will be widened and resurfaced with plant mix bituminous concrete to cost approximately $3,000,000; 1600 miles of oil treatment will be undertaken at a cost of $500,000. Also planned are 220 miles of high type paving, to cost $17,565,000, plus 30 miles of low type stabilized paving at $1,200,000. Surface treating and retreading on 2600 miles is estimated at $2,750,000. Construction of 140 bridges and grade crossing separa-

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tions will be undertaken at a cost of $5,300,000.

Not included in the above figures is $800,000 in highway excavation awarded in 1941 but carried over into 1942. This work involves 2,000,000 yards.

Although definite figures are lacking, officials estimate that about $19,700,000 of the 1942 program will go for military roads.

Ohio's equipment purchases totalled approximately $703,000 during 1941, and rentals totalled $75,000. There was no diversion of highway funds during the year.

Oklahoma

Funds for Oklahoma's 1942 road program will total $14,170,000, officials estimate. Of this amount, $8,900,000 has been tentatively allocated to construction, $4,000,000 to maintenance and $1,270,000 to other highway department expenditures.

State gas tax funds are expected to contribute the major share of the above funds, and will amount to approximately $10,560,000. Regular Federal Aid in the amount of $3,110,000 and other Federal Aid totalling $500,000, is expected.

Construction plans for 1942 are not as yet complete. Reports of Federal Aid projects as of October 31, 1941, reveal that Oklahoma had 9 grade crossing projects under construction, at a cost of $849,622, with 21 more approved for construction at $412,316. Secondary or feeder roads under construction totalled 1.7 miles at $139,310, and there were 85.2 miles of Federal Aid highway under construction at an estimated total cost of $3,108,341. An additional 72.9 miles of Federal aid highway were approved for construction, to cost $2,183,370.

Equipment purchases by the state totalled $400,000 for 1941.

Oregon

Difficulty in determining actual amounts to be made available from state and Federal funds has made it impossible to forecast Oregon's 1942 program at this time, highway officials state.

During 1941, the state spent a total of $17,750,000 on its roads: $7,400,000 went into construction, $4,230,000 was spent for maintenance, and other highway department expenditures amounted to $6,070,000.

Funds for 1941 included $2,100,000 from regular Federal Aid and $650,000 from other Federal funds; $12,850,000 from state gas taxes and a net of $2,150,000 from vehicle license fees and other state funds, after deducting $2,410,000 for counties and $355,000 for the state police.

Construction during 1941 included 260 miles of grading, 300 miles of gravel or crushed stone surfacing, 250 miles of oil treatment, 12 miles of high type paving, 60 miles of low type paving and 29 bridges.

Purchases of equipment totalled $525,000 for 1941; no rental costs were reported.

Pennsylvania

Beyond stating that funds available for the 1942 program

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are equivalent to those of the 1940 and 1941 seasons, during which approximately $40,000,000 was spent on construction, Pennsylvania highway department officials were unable to furnish details of the coming season.

Reviewing the state's $77,964,000 program for 1941, however, shows that $47,508,000 went for construction, $17,642,000 was spent on maintenance, and other highway department expenditures totalled $12,814,000. State funds contributed $69,964,000 and regular Federal Aid totalled approximately $8,000,000.

Highway excavation awarded in 1941 but carried over into 1942 for completion involves 5,943,000 yards at an estimated cost of $3,395,000.

Equipment purchases by the state amounted to $1,350,000 for the year, and an additional $5,000,000 was spent on rentals.

Rhode Island

Slightly above 1941 expenditures, Rhode Island's 1942 highway funds are expected to total $3,200,000. $1,800,000 of this amount will be devoted to construction and the balance, or $1,400,000, will be used for maintenance. The 1942 funds will be derived from regular Federal Aid in the amount of $800,000, plus approximately $2,400,000 from state funds.

1942 construction funds will be apportioned approximately as follows: Grading, $412,300; gravel or crushed stone surfacing, $133,000; oil treatment, $39,900; high type paving, $744,800, and two bridges at an estimated cost of $470,000. About $1,000,000 of this 1942 construction will be for military roads.

Not included in the above program is 16,610 yards of highway excavation at a cost of $6,644 which was awarded in 1941 but will be carried over into 1942.

Rhode Island's equipment purchases totalled approximately $135,000 during 1941, officials report.

South Carolina

News released by the state highway department indicates that construction work in 1942 will consist principally of access roads and other defense projects as required by the Federal government. The amount of Federal funds available has not yet been determined, but in view of the number of training centers in the state, it is expected that these funds will be considerable. New construction on non-defense highway projects will depend upon conditions, officials state. Maintenance and other department expenditures are expected to remain about the same as those for 1941.

During the fiscal year 1940-41 receipts and expenditures of the State Highway Department were as follows:

Receipts—	
Gasoline tax (5c)	$12,147,000
Motor vehicle fees	2,392,000
Federal aid	1,963,000
Bond sales	5,515,000
Others	31,000
Total	$22,048,000
Expenditures—	
Administration, and collection of revenue	$ 386,000
Construction	8,703,000

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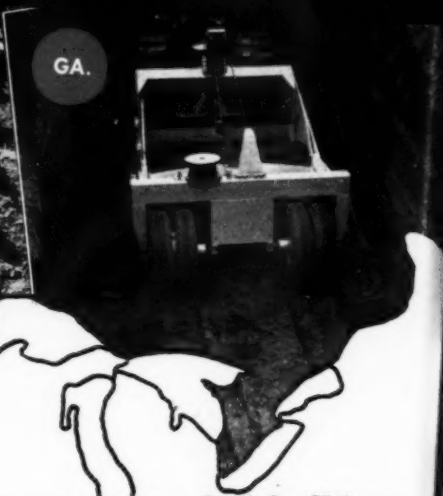

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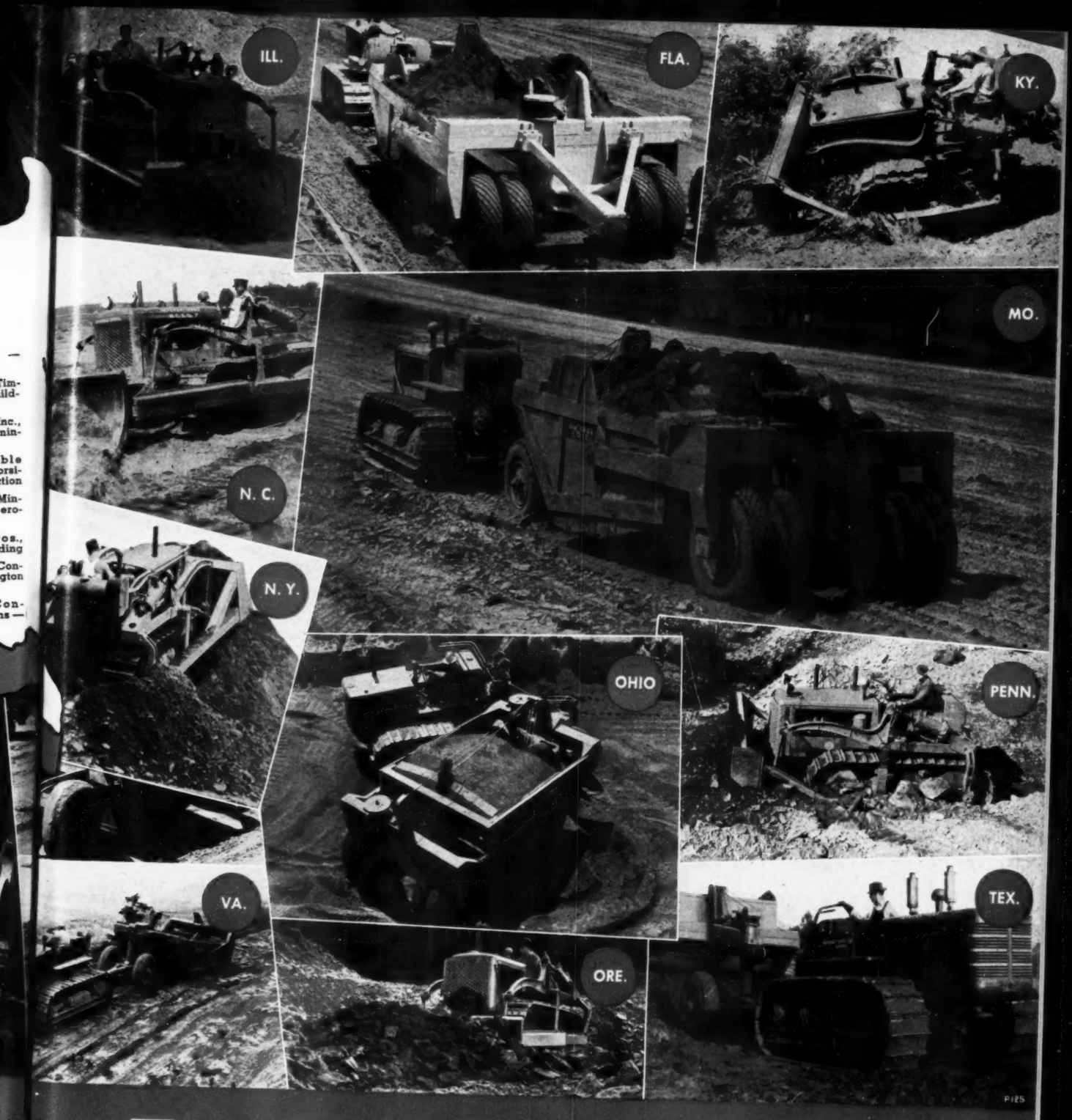

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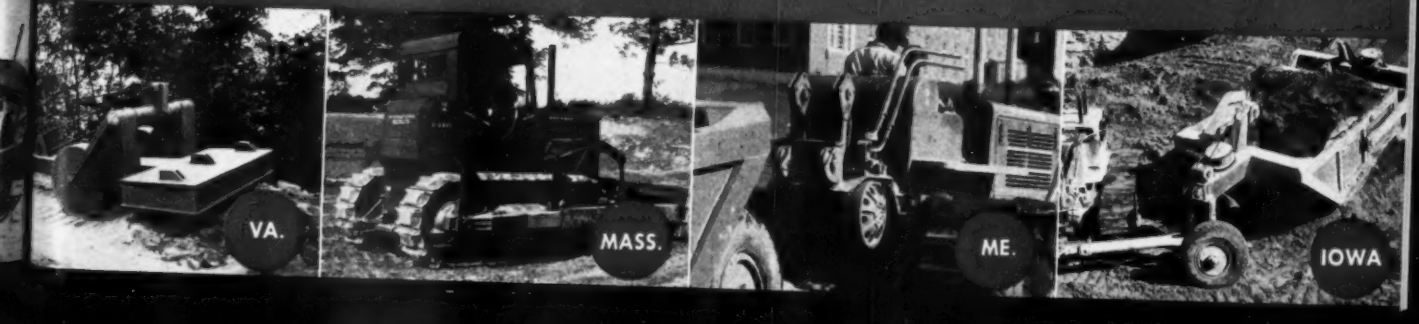


• One of the rock cuts in the South Dakota Black Hills section of U. S. 85A. This 3.5 mile grading job was handled by Northwestern Engineering Company of Rapid City for a contract price of $100,000.

Maintenance	3,836,000
Funded debt (pr. & int.)	6,933,000
Law enforcement	741,000
Others	204,000
Total	$20,803,000

Construction expenditures during 1941 amounted to approximately $9,500,000, which included $8,430,000 in construction contracts for roads and bridges. These covered approximately 22,000 feet of bridge work and 5 underpasses; 293 miles of earth road construction preparatory to hard surfacing; 174 miles of bituminous surface treatment, and 22 miles of concrete pavement.

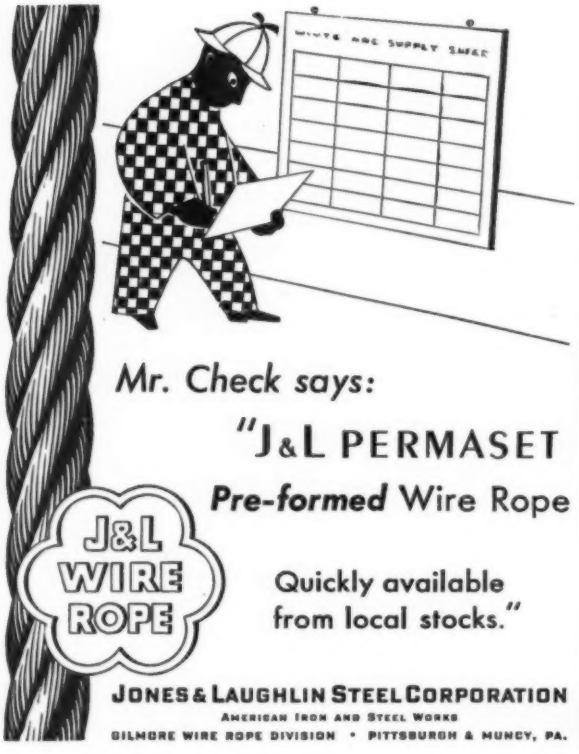
Maintenance cost records are kept by the fiscal year July 1 to June 30, and during the fiscal year ending June 30, 1941, maintenance expenditures were as follows:

Direct cost of maintenace, including labor, materials and supplies, operation of draw bridges and supervision	$2,092,576.12
Retreatment	933,491.44
Shoulder treatment	248,996.26
Special maintenance	7,835.11
Purchase of new equipment	553,239.11
Total	$3,836,138.04

Under a 1941 Act of the General Assembly, an additional 1,100 miles of roads will be added to the State Highway System in 1942. The same number of miles were added in 1941. There is not, however, any provision at law for continuing the extension of the State Highway System after 1942.

South Dakota

South Dakota's state highway commission reports an increase of approximately 5% in 1942 high-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way funds over 1941 expenditures. Main items in the 1942 total fund of $8,060,000 are: Construction, $3,900,000; other construction work already awarded, $1,260,000; maintenance, $2,250,000, and other highway department expenditures, $350,000.

Sources from which the 1942 funds will be made available include regular Federal Aid, $2,170,000, and other Federal Aid, $1,940,000. $3,300,000 is expected from state gas taxes and $650,000 from vehicle license fees and other state funds.

South Dakota's construction program for 1942 is as follows:

	Miles	Amount
Grading	200	$1,200,000
Surfacing		
Gravel or crushed stone on bituminous treated base	125	1,000,000
Oil treatment	85	450,000
Paving, high type	25	800,000
Surfacing	120	150,000
Bridges (number)	50	300,000

Highway excavation involving 2,000,000 yards at a cost of $260,000 awarded in 1941, will be carried over into 1942.

During 1941 the state spent approximately $125,000 on equipment purchases; no rental cost was reported. No highway funds were diverted to other uses.

Officials estimate that approximately $2,500,000 of the 1942 construction will be for military roads.

Tennessee

A wire from Tennessee reports the following available information:

FEDERAL FUNDS ALLOCATED ALONG WITH STATE FUNDS WILL PROVIDE APPROXIMATELY $6,-355,000 FOR EXPENDITURE ON THE FOLLOWING TYPES OF CONSTRUCTION WHICH HAVE BEEN PROGRAMMED. GRADING, DRAINAGE AND BRIDGES 84 MILES, BRIDGES AND APPROACHES 6 PROJECTS, GRADING AND PAVING 12 MILES, SURFACING 63 MILES, GRADE ELIMINATION PROJECTS 3, OVERHEADS AND APPROACHES 2. IN CONJUNCTION WITH WPA THERE HAS BEEN PROGRAMMED $4,000,000 IN CONSTRUCTION CONSISTING OF 257 MILES OF BASE SURFACE AND WIDENING AND 48 MILES OF WIDENING GRADES AND ROCKING SHOULDERS PRISON LABOR PROJECTS HAVE BEEN PLANNED INVOLVING $1,340,-000 IN CONSTRUCTION CONSISTING OF 149 MILES OF BASE SURFACING AND WIDENING AND 48 MILES OF WIDENING GRADES AND ROCKING SHOULDERS. MAINTENANCE PROGRAM FOR THE YEAR INVOLVES AN EXPENDITURE OF LABOR AND MATERIALS OF $1,800,000 AND EQUIPMENT RENTAL OF $650,-000. THE PURCHASE OF NEW EQUIPMENT HAS BEEN PROVIDED FOR IN THE AMOUNT OF $4,-000,000. ALL OF THE ABOVE MENTIONED PROGRAMS ARE SUBJECT TO ADJUSTMENT DUE TO THE WAR EMERGENCY. 1943 FEDERAL ALLOTMENTS HAVE NOT AS YET BEEN MADE AND ARE NOT INCLUDED IN ABOVE ESTIMATES.

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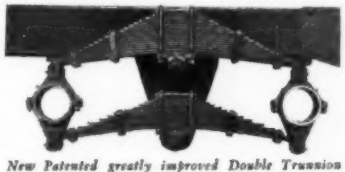

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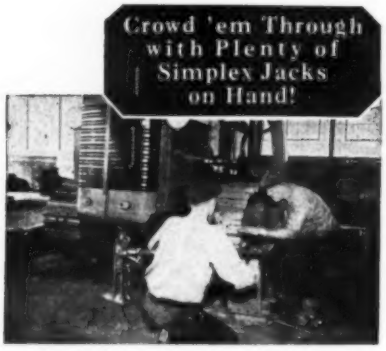
age under its jurisdiction, the Texas highway department is particularly concerned with the rapidly-changing highway situation under wartime conditions. As a result, no announcement of 1942 plans has yet been made.

During 1941, the total of highway construction and maintenance expenditures for the state reached $58,106,000 of which $48,404,000 went for construction and $9,702,000 was used for maintenance.



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In a report dated December 1, 1941, the status of the Texas state highway system was given as follows:

Type	Miles
Unimproved	1,486
Grading and small structures	1,089
Gravel, caliche, etc. surface	462
Asphalt surface (all types)	14,836
Concrete and similar types	5,426
Bridges completed—46 during year	
Park roads (state maintained)	104
	23,403
City mileage (not state maintained)	600
Other designated mileage (not state maintained)	2,356

Some idea of construction activity is given in the following tabulation, which shows the status of Federal Aid projects in the state as of October 31, 1941:

Under Construction

Type of Project	Miles	Estimated Cost
Highways	495.8	$12,971,773
Secondary or feeder roads	95.1	1,047,627
Grade crossings (number)	17	1,716,525

Approved for Construction

Type of Project	Miles	Estimated Cost
Highways	182.1	$ 5,484,880
Secondary or feeder roads	40.8	429,420
Grade crossings (number)	8	156,650

Utah

H. V. Richards, statistical engineer, forecasts a $7,960,000 fund for Utah roads in 1942. This represents an increase of $2,300,000 over 1941 figures, and includes $5,800,000 for construction, $1,500,000 for maintenance and $600,000 for other highway department expenditures.

Making up the 1942 funds will be an estimated $1,124,000 from regular Federal Aid, plus $487,000 from other Federal Aid and a proposed $2,000,000 under new defense highway allocations. State gas taxes will contribute approximately $4,300,000 and other state funds are expected to provide about $800,000 for county and city roads.

Proposed construction for 1942 includes $2,400,000 to be spent on 130 miles of grading, with minor structures, etc. Surfacing will include 120 miles of gravel and crushed stone requiring an estimated 1,500,000 tons of material and costing $950,000. Road or plant mix oil treatment on 100 miles is contemplated at a cost of $400,000, and 16 miles of four-lane high type paving is planned at $800,000. Structures to be built include 19 bridges at an estimated $1,100,000.

During 1941 the state spent approximately $250,000 on equipment purchases; no rental costs were reported. No diversion of highway funds to other uses took place during the year.

Vermont

Vermont's 1942 highway budget is expected to total $2,968,235; a slight increase over 1941 figures. Construction on Federal Aid and state highway systems is estimated at $1,868,235; maintenance on the state highway system will account for approximately $1,100,000 of the 1942 funds.

Sources from which the state's 1942 funds will be made available are Federal Aid, $668,235, and state gas tax revenue, $2,300,000.

No data as to the $1,868,235

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Nick Learns that Copper Miners are Big Shots

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"Seems like we're minin' more all the time. Getting it out faster, and cheaper, too. 'Course we can't claim all the credit for that. We're not

moving so much muck by hand. We got better drill sets. And we sure do a better blasting job.

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a box. It's saving these diggings money. Why, they're even using it underground now, when not so long ago, it was only found in the open pits. And Hercules beat 'em all to that kind of powder.

"The regular Hercules gelatins and extra gelatins have got a powerful kick in them. But in most places Gelamite* shoots just as good, and does it knock down costs! Well, Hercules was first to make a semi-gel like that.

"So the boss is standing pat with Hercules. He figures the Hercules service man will be the first to put us on to a good thing, 'cause he always was first. I'd play it that way myself."

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C-38

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1942 construction program is available at this time. Some 400,000 yards of earth, rock and borrow work costing $240,000 was awarded in 1941 and will be carried over into 1942.

Expenditures for equipment during 1941 were estimated at $62,500, as against $43,000 in equipment purchases during 1940.

Officials report that no highway funds were diverted to other uses during 1941.

Virginia

As reported for the state's fiscal year ending June 30, 1942, road funds available for the state total $34,170,495, an increase of $3,380,495 over the previous year. Figures on the 1942 funds are:

Construction	$17,483,156.00
Maintenance—	
Primary System	2,385,294.81
Secondary System	3,073,191.78
Improvements—	
Primary System	2,818,205.19
Secondary System	5,426,808.22
Other	2,983,839.00
Total	$34,170,495.00

The funds for the above program will be made available from regular Federal Aid in the amount of $2,551,495, state gas tax funds totalling $22,500,000, and vehicle license fees and other state funds amounting to $9,119,000.

No data on the proposed construction program for the state is available as yet. Reports on Federal Aid projects as of October 31, 1941, show that Virginia had 8 grade crossing projects under construction at a total cost of $718,013, with 7 more approved for construction to cost $106,935. In secondary or feeder roads, the state had 9.1 miles under construction, costing $374,996, and had an additional 4.5 miles approved for construction at $59,050. There were also 94.7 miles of Federal Aid highway under construction totalling $5,272,146, with 7.7 miles additional approved for construction at an estimated cost of $889,310.

Officials estimate that approximately $8,096,719 of the 1942 construction program will go for military roads.

1941 expenditures for equipment purchases totalled $210,000. No diversion of highway funds was reported.

Washington

H. G. Porak, plans and surveys engineer, reports that:

Total funds for Washington's 1942 road program are estimated at $12,230,000 including $7,560,000 for proposed construction, $3,820,000 for maintenance and $850,000 for other highway department expenditures.

Regular Federal Aid is expected to total $1,580,000 plus other Federal Aid in the amount of $578,000. State will contribute approximately $10,072,000, including state gas taxes, vehicle fees and other funds.

Approximately 72% of the 1942 construction funds will go for gravel or crushed stone surfacing, including grading; 12% will be used for oil treatment, and high type paving will account for 5%. Bridge construction amounts to 11% of the proposed construction budget.

Highway excavation awarded in 1941 but carried over into 1942 totals 1,200,000 yards at a cost of $500,000.

Equipment purchases by the state, not including equipment used on contract work, amounted to $258,000 in 1941.

West Virginia

With an increase of $2,000,000 over 1941 expenditures, West Virginia's total of funds expected to be available for 1942 total $22,765,000. Of this amount, $8,565,000 has been tentatively allocated to construction, $5,500,000 to maintenance, and $8,700,000 to other highway department expenditures.

1942 funds will be derived mainly from state sources. Federal Aid will amount to approximately $1,675,000; state gas tax funds will contribute $10,000,000, vehicle license fees and other state revenue, $6,000,000, and sale of road bonds is expected to net $5,000,000.

Construction funds will be used as follows:

	Miles	Amount
Grading	83	$1,565,000
Surfacing		
Gravel or crushed stone	150	2,000,000
Oil treatment	500	300,000
Paving, high type	50	2,500,000
Paving, low type	100	1,000,000
Bridges (number)	25	1,200,000

In addition to the above, work awarded in 1941 and carried over to 1942 will involve 368,200 yards of highway excavation at a cost of $125,200. It is estimated that approximately $4,000,000 of the 1942 construction will go for military roads.

1941 equipment purchases by

ROGERS Heavy Duty Trailers have all been pioneering achievements in their day even though the first model was crude in relation to the latest which facilitate easier loading, and embody greater stability and lower headroom clearance for loads.

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the state totalled $1,000,000 and an additional $200,000 was spent in rentals. There was no diversion of state highway funds during 1941.

Wisconsin

Wisconsin's road program for 1942 is impossible to forecast with any degree of accuracy at the present time, officials report.

During 1941, however, the state road expenditures totalled $33,000,000; an increase of $2,300,000 over 1940 funds. 1941 construction amounted to approximately $9,500,000 and maintenance costs ran to $4,500,000. Other highway department expenditures, including aids to local government units, accounted for $19,000,000 of the 1941 funds.

Principal sources of the 1941 funds were state gas tax revenues of $22,000,000, vehicle license fees and other state funds amounting to $13,500,000, regular Federal Aid in the amount of $2,350,000 and $1,000,000 in other Federal Aid.

Construction under the 1941 program included the following:

	Miles	Cost
Grading	136	$2,300,000
Surfacing		
Gravel or crushed stone	222	2,000,000
Bituminous surfacing	486	700,000
P. C. concrete paving	79	2,600,000
Structures		1,900,000

Approximately 4,000,000 yards of excavation, warded in 1941, will be carried over into 1942. Estimated cost of this excavation is $1,000,000.

Wyoming

All information available at present as to Wyoming's plans for 1942 is contained in the following statement received from the state highway department:

"If the volume of motor travel on Wyoming Highways holds up the same amount as in 1941, there will be available to the State of Wyoming approximately $2,300,000. This is a little more than was made available to the State in the way of highway user taxes and fees during 1941. Something over a million dollars will be necessary for general operating expense including administration and maintenance.

"Approximately two and one-half million dollars worth of work which is now under contract and uncompleted will be carried over in the next construction season. No program for construction has been made up, but it is anticipated that what meagre funds are available will be used for surfacing jobs which are now under contract or have been completed as to grading and bridge work, construction of some State secondary roads and some reconstruction in the way of placing armor coats, widening, additional base courses on the heavier traveled roads. It is possible that one or two grading jobs will also be included in the program.

"Approximately four and one-half million dollars worth of work has been put under contract during 1941 so that the construction program for 1942 will be considerably less than half of the construction work in 1941. Of course in 1942, the figure will be possibly increased depending upon the attitude of the authorities in Washington."

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NOT in the *Contract*

Rastus had been arrested for speeding. This was his fifth offense and as he was presented to the Judge, he muttered darkly under his breath. It sounded suspiciously like an oath.

"Repeat that!" thundered the Judge.

"Ah didn't say nothing," begged Rastus.

"You did say something and I want you to repeat it!"

"All ah says was God am de jedge, God am de jedge!"

Cutie (in department store): Do you have notions on this floor?

Floorwalker (appraisingly): Frequently, but we can't give way to them during business hours.

"And are you really content to spend your life walking about the country begging?" asked the old lady severely.

"No, lady," answered the tramp. "Many's the time I wished I had a car."

Mother: "Daddy and I won't be home tonight, Johnny. Do you want to sleep alone or with nursie?"

Johnny (after some deliberation): "What would you do, Daddy?"

An inebriated man was trying to unlock the door of his house without success when a passing policeman asked if he could handle the key for him.

"Nope," the drunken man said, "I can hold the key. You hold the house."

A young lady, finding herself stranded in a small town, asked an old man at the station where she might spend the night.

"There ain't no hotel here," he said, "but you can sleep with the station agent."

"Sir!" she exclaimed, "I'll have you know I'm a lady."

"That's all right," drawled the old man, "so is the station agent."

"Did you say winch trouble?"

Nuts to You

We ain't one to use nothing but the best English, the title being purely historical comes from the Middle Ages when people apparently felt that actions spoke louder than words.

When a medieval chap wanted to wed, he'd invite himself to dinner, which was the same as a proposal.

If the girl was willing, she'd really go to town on the feedbag, so to speak, and put on a fancy spread.

But if she was cool to the proposition, she'd serve him only a bowl of nuts, indicating he could look elsewhere for his chow and his ball and chain.

Catch?

Shovelrunner (in hospital): "Doctor, are you sure this is pneumonia? Sometimes doctors prescribe for one thing and the patient dies from something else."

Doctor (with dignity): "When I prescribe for pneumonia you die of pneumonia."

"I'm losing my punch," said the sweet young thing as she hurriedly left the cocktail party.

Sonny: Ma says she could have soled her shoes with this steak I brought back.

Butcher (sarcastically): Why didn't she?

Sonny: 'Cause she couldn't get the nails through it.

"I say!" called the bus driver to the passengers below, "is there a mackintosh down there big enough to keep three young ladies warm?"

"No," came an eager voice from the inside. "But there's a McPherson doon here that's willin' to try."

A young lady, with a touch of hay fever, took with her to a dinner party two handkerchiefs, one of which she stuck in her bosom. At dinner she began rummaging to right and left in her bosom for the fresh handkerchief. Engrossed in her search, she suddenly realized that conversation had ceased and people were watching her, fascinated.

In confusion she murmured, "I know I had two when I came."

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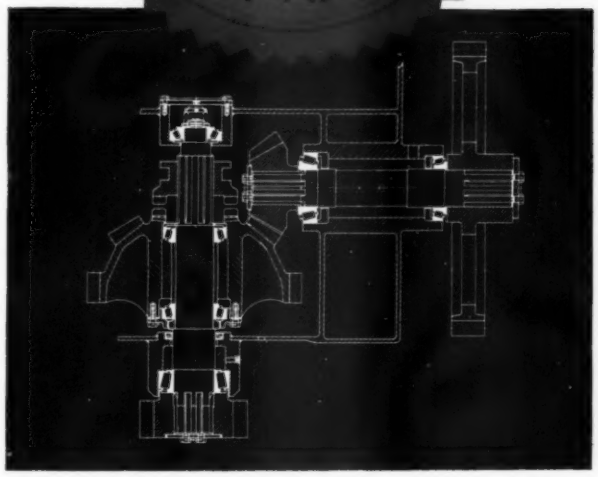

The above drawing shows the application of Timken Bearings to the horizontal transmission shaft of the Bucyrus-Erie Model 15-B ½-yard shovel. Timken Bearings also are used on the intermediate vertical swing shaft.

With the aid of modern equipment like this Bucyrus-Erie Model 15-B Half-yard Shovel, the construction industry is meeting the emergency splendidly. Speed, endurance and operating economy will be equally important factors in the years to come, when ability to beat out close bids and make a profit will be necessary for successful contracting. Make sure your new machines have a full complement of Timken Bearings at all points of friction and hard service.

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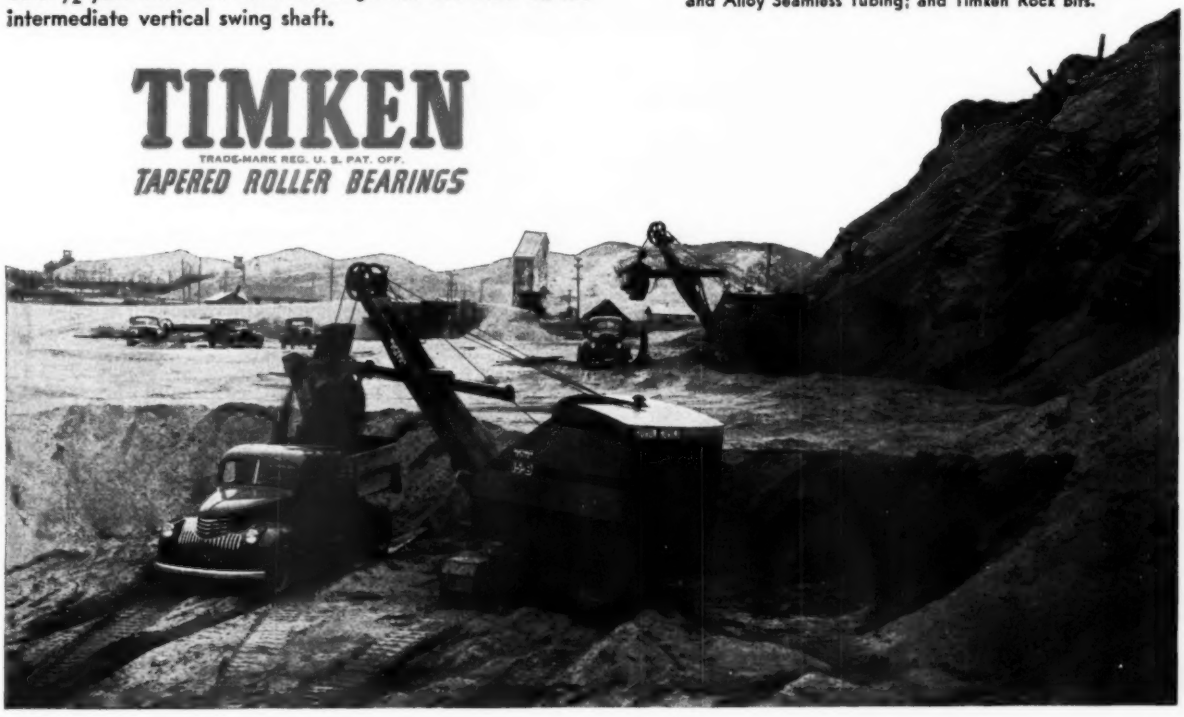

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Neal Hawkins

(Continued from page 23)

His theory is that equipment should have a little more capacity and power than necessary, rather than barely suitable for any work it is called on to do.

For example, note the two Rogers trailers mentioned above. Many contractors would use truck-mounted shovels when faced with as many long distance moves as Hawkins has to make from job to job. But Hawkins claims that digging efficiency is more important to him than mobility, hence from the beginning of his power shovel experience he has preferred crawler treads. He could have bought a couple of trailers a little stronger than necessary to haul around his 10-ton Bucyrus-Erie 10-B shovels, overloading them about 100% with the Bucyrus-Erie 20-B or the Lorain 40-A shovels, because the biggest loads he has to haul, aside from the shovels, are seldom more than 10 tons. Instead, he bought trailers strong enough to carry the heaviest of his shovels, and far stronger than necessary for ordinary loads.

Another Hawkins theory is that breakdowns cost more than the slight extra price of stronger equipment, and because his choice of equipment is made on this basis, his operations are seldom interrupted by mechanical failures.

Always on the alert for opportunities to figure on work either safely within the limits of the equipment he owns or amply justifying an investment in additional equipment, Hawkins has made an excellent record on jobs in North Carolina, South Carolina and Virginia. Recently completed contracts are: Wilmington Shipyards, Wilmington, N. C.; Indoor Stadium, Duke University, Durham, N. C.; Marshall Court Housing Project, Newport News, Va.; Simon-Bright Housing Project, Kinston, N. C.; Gonzales Gardens Housing Project, Columbia, S. C.; Excavation, Drexel Furniture Co., Marion, N. C.; Excavation, Cleveland Mill & Power Co., Shelby, N. C.; Army Base, Ft. Bragg, N. C.; and a theater excavation for the "Gay" Theater at North Belmont, N. C.

• Men and machines at work on an underpass at Marion, N. C., pose for their picture. In the foreground is one of the company's Bucyrus-Erie ⅜-yard shovels; in the background, the Universal that loaded its first dirt to horse drawn dump wagons.

Contractor Hawkins rarely leases equipment from others, although he will lease to others. He believes that he can make a surer profit by using his own equipment than by paying a profit to others for the use of their equipment.

Arizona Road Job

(Continued from page 27)

derpass and excavation started on the opposite side of the canyon.

Work there followed in much the same order. The Hug trucks, never hauling more than 2,000 feet, usually travelled in reverse down grade to the end of the dump. This was done because the fill was very narrow and more time was wasted in turning around to dump the load than was used in backing down. Loads were dumped off the end of the rock fill. Stones and boulders remaining on top of the roadway after being dumped were pushed over the edge by a Caterpillar D-8 mounted LeTourneau bulldozer.

Alternate Excavation and Drilling

In order to operate to the best advantage, the excavation hours were staggered with the drilling hours. All secondary shooting was so managed that the shots were pulled during a lunch period. In this manner shovel and trucks were not delayed.

When the right wall of the canyon had all been blasted away and the fill extended across the gorge, Orr's crew concentrated on the lower end, nearer to the village of Superior. Here the new road, closely paralleling the old one, created a major problem of traffic diversion. There was just one thing to do; hold up traffic when a blast was pulled, and clean up the littered highway as quickly as possible with a bulldozer. By careful study earlier in the job Mr. Orr found that peak hours for traffic were in the morning and late afternoon. By shooting during the lull he was able to get away from extensive tie-ups of traffic.

In this lower end were a number of corrugated pipe drains, placed under the fills to carry off the water. These were set in ditches dug by a 1¼ cubic yard Bucyrus-Erie machine well in advance of fill work. The road winding around a curve cut through a low point in the pass where a little stream trickled. Considerable clearing in one small area was necessary there.

Mineral aggregate was mixed with Type SC4 road oil for the finished black top pavement. Black top roads make excellent wearing surfaces here, for the foundation, carved from solid rock, prevents dips and washboards common to black top roads wherever the foundation is inadequately stabilized.

A camp was maintained on the

job site, and for $1.50 per day quarters and excellent meals were furnished to the men. Since many of Mr. Orr's employees were old men from the point of company service, with homes established near his Phoenix headquarters, many of them availed themselves of the camp facilities. An excellent testimonial to the experience and good judgment of the entire Orr management is the fact that no serious accidents were suffered by any of the men, or the traveling public.

Major quantities of the Orr contract included: 174,000 cubic yards roadway excavation; 9,000 cubic yards drainage excavation; 4,200 cubic yards structure excavation; 1,500 cubic yards concrete; 170,000 pounds steel reinforcement; 1,200 linear feet 24", 30" and 48" c.m.p. drains; 4,750 linear feet road guard; 5,000 tons mineral aggregate; 43,000 gallons SC4 road oil and 85 tons of emulsion for seal coat.

The project was completed and accepted within the contract time on November 20, 1941 and traffic at the rate of about 125 cars per hour is now rolling through old Suicide Canyon swiftly and safely. The improvement of this stretch of roadway ends one of the bad "bottlenecks" of the fine scenic mountain highway system running through Arizona's "Land of the Sun."

Building a City . .

(Continued from page 21)

from the project. A Lorain 87 shovel and 35 dump trucks of various makes equipped with Wood hoists were brought in to move this conglomerate. Hauling about 2,600 feet, the trucks gradually built roads over the place so the lumber and material trucks could get through.

Excavating Utility and Sewage Trenches

Adequate utility mains and sewage lines are an essential part of any city, and it was no exception here. Exactly 45 miles of water and sewer pipe were laid, with ditches of varying width and depth, containing nearly 1,000,000 cubic yards of excavation, being drawn into the plans. It was necessary to cut the main feeders and laterals through material so hard that it had to be blasted to a full foot overdepth by drilling holes as close as three feet center to center and sometimes using in excess of a pound of powder per cubic yard of rock.

Strange indeed was the character of this excavation. Lying under the top few feet of soggy mush was from 1 to 3 feet of tertiary sandstone. That whole mass was undershot with conglomerate composed of round alluvium up to 4 inches in diameter, all cemented tightly together by lime from ancient crustacean shells dating back millions of years ago. This geologic magic of other days produced a substance actually harder and more explosive resistant than solid rock would have been.

Thirty-five Ingersoll-Rand jackhammers and 20 compressors of various makes were brought in to furnish the air necessary for driving through the hard rock. Down the main streets, where the depth of trench closely approximated six feet, it was necessary to drill holes on 3 foot centers 7 feet deep. These were loaded with a detonator, one stick of 60% gelatin and several cupfulls of 65% Hercomite bag powder. Figured on the basis of pounds per cubic yard, about one pound of explosive was used for every cubic yard of rock shot. This is more powder than is generally used in trench work because of the presence of the cemented conglomerate.

After being broken up, the trenches were excavated by two Model 31 Parsons trenching machines. These machines backed up along the ditch lines, casting the material off to the side where it would later be available for backfilling operations. The Parsons machines excavated about 35 cubic yards per hour in the heavy digging, and did slightly better in easier material where earth and tertiary sandstone were encountered.

For digging the laterals, and for scooping material in the mains which was too hard for the Parsons machine, two Bucyrus-Erie 10-B draglines were brought in. Being especially mobile, it was as easy to maintain the ditch line with the 10-B as with the trenching machine. The small dragline crawled at speeds up to 4.25 miles per hour to other locations where it was needed. On straight ditch work of this kind where favorable working conditions made possible a full shift spent in one location, the 10-B was able to account for as high as 45 cubic yards per digging hour. Later in

• A Linda Vista water main is carefully lowered into a waiting trench by an Allis-Chalmers "M" mounted Hough blade.

the job, to accommodate increased demand for sewer lines, a P&H Model 150 trench hoe and a Lima Paymaster trench hoe were brought in for a short time.

Placing Sewer Pipe

After the trench was dug, the sections of sewer pipe were lowered in place by another Bucyrus-Erie 10-B machine rigged as a crane. This machine easily kept pipe placed up to the excavation limits of all the excavators on the job. Aside from the regular operator of the machine, a laborer for hooking the sling around the pipe sections completed the mechanical crew. Very often this little machine picked up and set over 600 feet of pipeline per day. As the backfill progressed over the line, excess material left from excavation was smoothed out by either a Caterpillar or an Allis-Chalmers mounted bulldozer.

While excavation is the groundwork of all construction, McNeil and Zoss still were far from finished even when all the muddy digging was over. Houses had to be built on the graded sites. Surveying and plumbing and plastering and forty-six other things had to be done, for construction of the houses was set up to provide 49 separate steps from start to finish of each building. For the same reason that centralization of authority is necessary in civil government, this construction job also needed a central advisory point to insure that all of those 49 steps would be done and done at the scheduled time. The chart room served that function. It was literally the "nerve center" of the job.

In the control room each step in the progress of construction of each house was charted. Take a typical case, for instance. The surveyors have finished staking the site of Building No. 112. A report is made immediately and sent to the chart room. The completed survey operation is posted, and an expert building engineer then orders the foundation crew to proceed with the work they have to do. And so on in their turn come the carpenters, the plumbers, the glaziers, and all the other workmen who play so vital a part in keeping the job moving on the basis of an assembly line.

The most common illustration of assembly line production familiar to everyone is the automobile factory. There a line of material moves past a stationary line of labor. The material is assembled, bolted and welded together, and other parts and materials are installed to build the finished automobile. The McNeil and Zoss assembly line arrived at precisely the same results with the automobile system reversed. In other words, the houses (representing the material), remained stationary in their respective locations, and the line of labor moved past the stationary line of material to do its work. The chart room, or nerve center, issued orders which governed the orderly movement of the line of labor. It was efficient, and it was nice to watch a program functioning so perfectly that, despite the mud, 48 houses were being completed per day.

By breaking up the operation into 49 different steps the con-

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GATKE Clutch Facings. Made for ALL requirements.

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Operators all over the country agree that *when you have GATKE Brake Lining and GATKE Clutch Facings, you have the best.*

GATKE Asbestos Friction Products have been perfected for every *brake and clutch* — LARGE or small.

Experience and knowledge acquired in 28 years of development to meet operators' service requirements go into their making.

Whatever your equipment or service, just tell us what you want. We *understand* service requirements and *we have what it takes* to meet them!

GATKE CORPORATION
232 N. La Salle St. Chicago, Ill.

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tractor was able to centralize the responsibility of each crew. Carpenter work, for instance, was divided into nine headings. By doing it this way the contractor was able to make the rough carpenters responsible for building foundations. Flooring carpenters by the same token made certain that flooring was laid when ordered by the chart room. There were no jumbled bottlenecks in this system, such as might have resulted had a general carpenter crew, scheduled to lay floors, been busy on building foundations or some other diversified branch of their craft. By taking a few basic steps from the 49, then, it becomes possible to see how the houses went up.

The surveyors had scarcely finished before the rough carpenters moved in to set the foundation forms in place. Concrete then followed, often within an hour after the forms were checked off in the chart room. A central batching plant, producing 90 yards of concrete an hour, was set up near the center of the project, where necessary aggregates, cement and water were dumped into a fleet of Rex trucks mounted transit mixers. The only difficulty in pouring the concrete resulted because of disagreeable mud conditions. A standby tractor had to be kept with the concrete crew to pull the loaded transit mixers through the mud which laid on all sides of the road.

Pouring Concrete Foundations

Concrete for the foundations and steps was handled from the transit mixers by a Bucyrus-Erie and two Northwest cranes, equipped with ½ cubic yard Gar-Bro buckets, into which the concrete was dumped. The concrete was poured with a low water-cement ratio, and was consolidated by Mall vibrators. The resulting mix was considerably better concrete than is generally used for building foundations in this part of the country. A group of San Diego realtors, visiting the project, were impressed by the excellence of the concrete.

"You're pouring Shasta Dam concrete down here," one complimented the superintendent. "It isn't often that we see that class of concrete going into building foundations."

In addition to the work outlined, a water main was laid from the job to San Diego. This welded line followed the main road down the side of a hill into the city. Excavation of the trench was done by one of the Parsons trenching machines, and the pipe was fabricated on top of the ground and lowered into the trench after it had been welded. A cable was hooked on to an Allis-Chalmers "WM" mounted Hough loader and the pipe was lifted up. Then, when cross timbers were removed, it was lowered in place. Backfilling was done by the Hough shovel used alternately with the Crook bulldozer on the Allis-Chalmers tractor.

The entire 1,767 buildings were designed with an eye to the future. Occupants pay rent in proportion to their incomes. When the present emergency is over, the homes will be offered for sale by the government to whomever wishes to buy.

HOW can production be speeded? How can essential materials be best conserved? These, today, are vital questions. With wire rope, the answer is in using the quality, construction, and type that can be installed the quickest . . . that will last the longest, and thus will do the most work for the amount of materials employed.

You can depend on Preformed "HERCULES" (Red-Strand) Wire Rope for this 2-Way Saving. It not only lasts longer — which means fewer replacements — but, because it is easier to handle, it can be installed more quickly. It provides all the advantages of the preforming process, *plus* the inherent qualities and advanced manufacturing methods that have long since caused the "Red-Strand" to be recognized as the sterling mark for wire rope.

Why not take advantage of this 2-way saving? In doing so you will also be reducing your operating costs, for the principles that make "HERCULES" long-lasting, also make for maximum economy.

We especially recommend the Preformed type of "HERCULES" (Red Strand) Wire Rope for use on backfillers, bulldozers, carryall scrapers, clamshells, conveyors, cranes, draglines, dredges, hoists, shovels, skimmers and trench hoes.

MADE ONLY BY
A. LESCHEN & SONS ROPE CO.
WIRE ROPE MAKERS — ESTABLISHED 1857
5909 KENNERLY AVENUE — ST. LOUIS, MISSOURI, U. S. A.

NEW YORK • • • 90 West Street
CHICAGO • • 810 W. Washington Blvd.
DENVER • • • 1554 Wazee Street
SAN FRANCISCO • • 520 Fourth Street
PORTLAND • • 914 N. W. 14th Avenue
SEATTLE • • 3410 First Avenue South

For your convenience in writing to A. Leschen & Sons Rope Co., you will find a card bound in this issue.

Notes from the manufacturers

The Buda Company, Harvey, Illinois, announces that A. A. Gustafson has recently been appointed director of personnel and safety of the company. He is a graduate mechanical engineer from Purdue University. For the last year and a half he was employed by the U. S. Federal Government as a safety engineer where he successfully organized and directed a safety division for one of the federal government departments in the State of Illinois. The Company also announces the appointment of Ralph R. Hayes as eastern district sales manager. He will be attached to their New York office with headquarters at 253 West 64th Street, New York City. Mr. Hayes replaces Lew Crafts who recently resigned from the organization.

The Cleveland Tractor Company, Cleveland, Ohio, recently played host to 5,000 employees and their families at "Open House Ceremonies" celebrating the firm's 25th anniversary. The company, founded in 1916 as the Cleveland Motor Plow Company by Rollin H. White, chairman of the board of directors, is building high-speed military tractors for the Army and is also manufacturing parts for tanks and other defense units.

The Asphalt Institute, New York, N. Y., announces that four more asphalt producing companies have joined the institute. The new members are: Home Oil and Refining Company, Great Falls, Montana; Husky Refining Company, Cody, Wyoming; Independent Refining Company, Billings, Montana; Yale Oil Corporation, Billings, Montana. This brings the total membership of the Asphalt Institute to 29.

Kotal Company, of Summit, New Jersey announces the acquisition of the business heretofore conducted by Asphalt Treatment Corporation, of New York, N. Y.

LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa, announces the appointment of C. M. Daniel to the sales department at Cedar Rapids. Mr. Daniel has been sales promotion manager for the International Harvester Company at their Terre Haute, Indiana, branch.

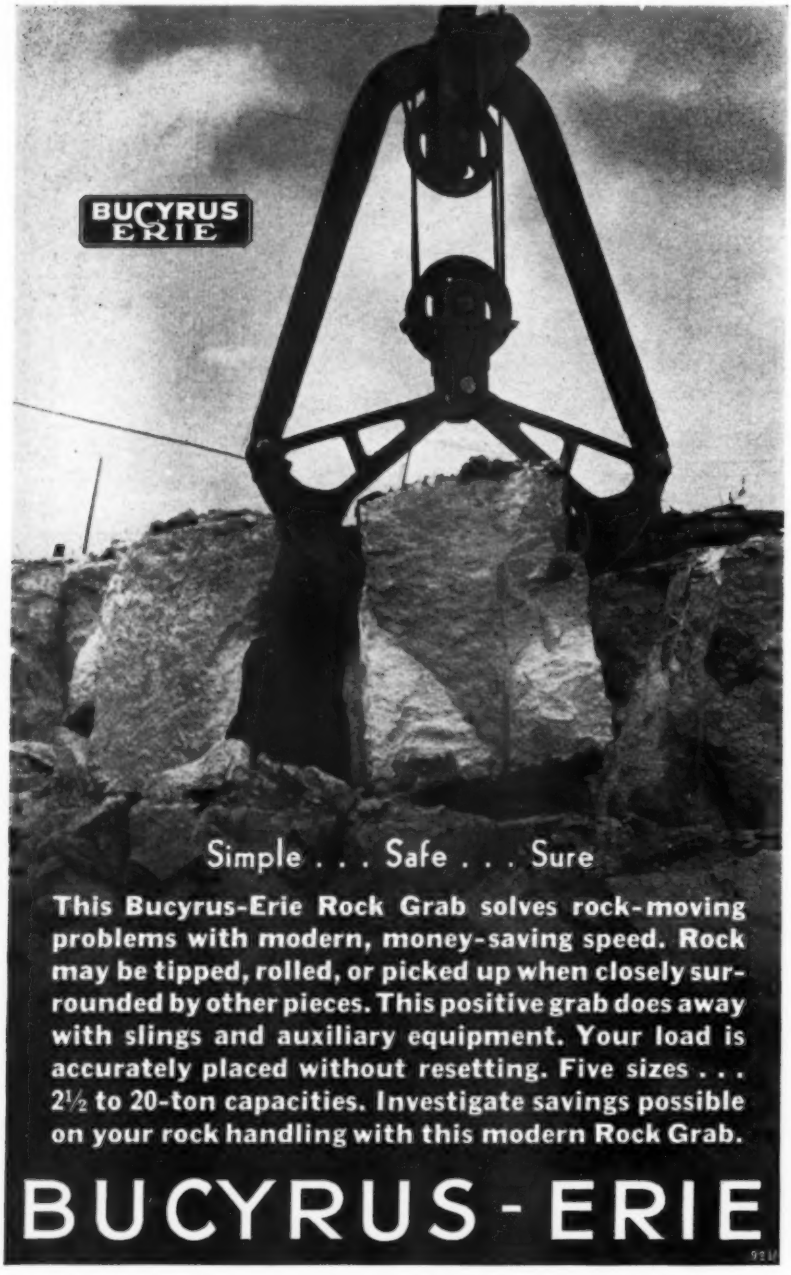
Sauerman Bros. Inc., 438 S. Clinton Street, Chicago, Illinois, have been saddened by the sudden death of Gilbert H. Tompkins, December 2, at his home in Chicago. Mr. Tompkins was born at Butler, New York, September 29, 1884. He joined the Sauerman organization in October, 1909, and was with them continuously from that date. He became secretary of the firm in 1925 and held that position until his death.

The Harnischfeger Corporation, Milwaukee, Wisconsin, has announced the appointment of the Western Equipment and Supply Company, Rock Island, Illinois, as agent for P&H excavators.

Chain Belt Company, Milwaukee, Wisconsin, announce the appointment of Dow and Company, Inc., Buffalo, New York, as distributor of Rex construction equipment in the Buffalo and Rochester area.

Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pennsylvania, announces the election of T. I. Phillips as a vice president of the firm. Mr. Phillips started with the company as a toolmaker in 1915 and has been assistant to the president of the company since early this year.

Chicago Pneumatic Tool Company, 6 East 44th Street, New York, N. Y., announces the promotion of Joseph A. Sullivan from assistant publicity manager to advertising manager according to word from Leslie S. Gillette, sales development manager.


BUCYRUS ERIE
Simple . . . Safe . . . Sure
This Bucyrus-Erie Rock Grab solves rock-moving problems with modern, money-saving speed. Rock may be tipped, rolled, or picked up when closely surrounded by other pieces. This positive grab does away with slings and auxiliary equipment. Your load is accurately placed without resetting. Five sizes . . . 2½ to 20-ton capacities. Investigate savings possible on your rock handling with this modern Rock Grab.
BUCYRUS-ERIE

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.

New trade literature

Title: **"The Strong Shall Be Free!"**

Subject: A graphic story of International Harvester's part in arming the United States presented in an interesting 36-page booklet. The presentation is timely and gives a clear picture of what industry is doing to help win the war. Various uses of International Power are illustrated—in the army—defense construction—ammunition supply and on the home front.

Where to Get: International Harvester Company, 180 North Michigan Avenue, Chicago, Illinois. Free upon request.

Title: **"Foundations Of Bridges and Buildings"**

Subject: Completely revised, this new third edition covers many developments in the field of foundation engineering. The more important phenomena in the field of soil mechanics are covered; new material on piling is presented; the discussion of cofferdams and caissons has been expanded; there is also a chapter on land foundation in open excavation and control of water; material has been added on grouting. Protection of piling is also covered. Illustrations aid greatly in presenting an interesting, understandable text.

Where to Get: McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York, N. Y. Price $5.00.

Title: **"New Encyclopedia of Machine Shop Practice"**

Subject: A guide to the principles and practice of machine shop procedure. The book is cloth-bound and may be obtained in either the plain or thumb-notch index editions. Contains 548 pages of useful information and is profusely illustrated with line drawings. Some of the many problems and subjects treated are: bench work; metals in engineering production; the lathe; thread cutting; taper-turning, knurling, and other uses of the lathe; milling and grinding; special machine tools; gears and gear cutting; jigs and fixtures; pressing, stamping, and punching; heat treatment of metals; welding, etc.; foundry work and machine drawing.

Where to Get: Wm. H. Wise & Company, Inc., 50 West 47th Street, New York, N. Y. Price $1.98 for plain edition and $2.48 for thumb-notched indexed edition.

Title: **"Industrial Control Devices"**

Subject: This new 56-page, two color catalog is a comprehensive source of information for all interested in learning how production may be increased and costs lowered. It may be readily understood by the engineer and layman alike. Large, clear photographs illustrate forty-four industrial controls and safeguards. Complete specifications and informative details are given for all types covering what they are, how they are used, features, capacities, production and operation.

Where to Get: The Brown Instrument Company, Wayne & Roberts Avenues, Philadelphia, Pennsylvania. Ask for Catalog No. 8301. Free on request.

Title: **"Diesels on Defense"**

Subject: A 24-page booklet printed in 2 colors, reveals the enormous part "Caterpillar" is playing for our war effort and for the friends of America during the present war. Facts, figures and pictures from typical defense jobs at home and abroad graphically prove the masterful work Diesel power is doing.

Where to Get: Caterpillar Tractor Co., Peoria, Illinois. Free upon request. Ask for Form 7016.

Title: **"Cash For You And Your Family"**

Subject: A comprehensive 32-page booklet to fill an evident need for information about the cash benefits of the Social Security Program, prepared by the Commodity Research Bureau, Inc., for distribution by employers to their workers. All information was compiled from official government sources. The booklet is vitally important in terms of dollars and cents.

Where to Get: Commodity Research Bureau, Inc., 82 Beaver Street, New York City, N. Y. Free specimen copy to employers and executives upon request.

Title: **"High Speed Earthmoving Equipment"**

Subject: A 16-page booklet printed in two colors telling the history and development of the LaPlant-Choate CW-10 scraper used with a Caterpillar DW-10 tractor, and describes the many design features, the bowl, hydraulic system, wheels and brakes. Included also is a section on the TW-10 scraper which is the same machine but with front wheel assembly for use with track-type Caterpillar tractors.

Where to Get: LaPlant-Choate Manufacturing Company, Inc., Cedar Rapids, Iowa.

POSITIONS WANTED

Address all box numbers
c/o EXCAVATING ENGINEER
South Milwaukee, Wis.

SUPERINTENDENT OR FOREMAN
Experienced, age 31, draft class 3-A, single, sober, good pusher, American citizen, 10 years experience, on grading, rock excavating, clearing and grubbing, drainage structures, pile driving and general contracting. Knows estimating, higher accounting, timekeeping, good organizer, best of references. Will go any place and sign period of time. Box 9183

OPERATOR
Twenty-five years experience operating, erecting and repairing steam, gas, and electric shovels and cranes. Would like steady work. Box 9182

POSITION WANTED
Strip mine superintendent or manager. 25 years experience. Capable of taking complete charge of large operations. Box 9184

OPERATOR
Wanted—Steady work for good operator—20 years experience—steam, gas, diesel shovels—draglines, clamshells. Quarry, gravel pits, coal stripping. Lots of highway work. Can operate all makes of machines, maintain any kind. Fast operator—go any place in U.S.A. Age 47, no booze—married—start work at once. Joe Paulson, Box 130, Tamms, Illinois.

OWENS 'Dig In' FOR DEFENSE
A MOUTHFUL AT EVERY BITE
The OWEN BUCKET Co.
6095 BREAKWATER AVE. CLEVELAND, OHIO
BRANCHES: New York, Philadelphia. Chicago, Berkeley, Cal.

For your convenience in writing to The Owen Bucket Co., you will find a card bound in this issue.

BARGAINS IN USED EQUIPMENT

FOR SALE, RENTALS, BUSINESS OPPORTUNITIES, TRADES, ETC.

To the reader wishing to advertise used equipment in the "For Sale" Section: All advertising in this section is payable in advance. Enclose your check or money order with copy. Rate: 60c per line. Minimum charge $2.40. No discounts; no commissions. If no change in copy is desired, three continuous insertions are offered for the price of two. Read these instructions carefully. Each line contains 41 characters (34 characters if all capital letters are used). Count spaces and punctuation as one character each. Allow 10 characters for box number, if blind advertisement is desired. Count your own copy to save delay. Holding up your advertisement one month to secure approval of revised copy or an additional remittance may cost you real money in a lost sale. Be sure to enclose the correct amount of money with your order. Closing date—15th of preceding month. Example: January issue closes December 15th.

To the reader wishing to answer "For Sale" Section advertisements appearing on these pages: Be sure to address your inquiry to the advertiser by using the correct box number. Mail your letter in care of Excavating Engineer, South Milwaukee, Wisconsin. Write each advertiser a separate letter. Do not write us for name and address of advertiser. This information will not be given out. We have no information about the equipment advertised other than that shown in the advertisements themselves.

SMALL SHOVELS, CRANES AND DRAGLINES
Up to 2½ Cubic Yards

INSLEY MODEL R ½-yard gas shovel, dragline and clamshell. Engine completely overhauled. Good as new. Balance machine thoroughly field checked—some new parts added. Located Indiana. Box 2783

FOR SALE

1 **LORAIN** ¾-YD. shovel and trench hoe Serial No. 1667—excellent condition. $7,000.
1 **LORAIN** ½-YD. crane—like new. Serial No. 9767. $5,500.

V. P. Serodino Co., 7 W. 74th St., Cincinnati, Ohio
Valley 5818

BUCYRUS 50-B STEAM Shovel No. 4221. Caterpillar mounting, 17' dipper handle, 2 cu. yd. dipper. In good condition. Located in Eastern Ohio.

The Warner Collieries Co.
570 Union Commerce Building
Cleveland, Ohio

1¼ Yd. Steam Shovel Attachment with boom and stick for 41B Steamer—$750.00.

LEICESTER CONTRACTING CORP.
305 Madison Ave., New York, N. Y.

BUCYRUS-ERIE 20-B, ¾ yard 2 motor electric shovel. Suitable for power supply of 3 phase 60 cycle 440 volt. Now operating. Located Tennessee. Box 2738

FOR SALE

1 Bucyrus-Erie 43-B 1⅜ cu. yd. shovel operated by Buda Lanova diesel engine. Excellent condition.
1 Marion Model 361 shovel equipped as standard shovel with 1½ cu. yd. bucket operated by Buda JV6L gasoline engine with electric starting equipment.
1 P&H model 650 shovel, 1¼ yd. machine with Waukesha gasoline engine. Exceptionally good condition.
1 Northwest Model 25 standard shovel, operated by 6 cylinder 4¼ by 5" Wisconsin gasoline engine with electric starter, 24" alloy treads. Purchased new Dec. 1st, 1939. Includes 55' clamshell attachment (no bucket).
1 Bucyrus-Erie 43-B standard shovel with 1⅜ cu. yd. bucket insert teeth and operated by Wisconsin gasoline engine. Machine in good operating condition.
1 P&H Model 700 shovel equipped as standard shovel with 1¼ cu. yd. bucket operated by Wisconsin gasoline engine. Good condition.
1 Bucyrus-Erie steam shovel equipped as standard shovel. Good condition.
1 Michigan model No. T6 truck shovel operated by Hercules engine JXC551248 complete with shovel and crane attachment with bucket. Box 2846

LARGE SHOVELS, CRANES AND DRAGLINES
2½ Cubic Yards and Over

BUCYRUS-MONIGHAN 3-W Diesel Dragline. 85' boom. 3-yd. AX drag bucket. Located Northeastern Oklahoma. Very good condition. Box 2727

LIMA 1001 Electric Dragline. 60' boom. 2½ yard Heavy Duty Esco drag bucket. 1000' power cable. Motor 200 HP Slip ring type 3 phase 60 cycle 440 volt. Excellent condition. Located California. Box 2747

BUCYRUS-ERIE 50-B Electric Shovel. 30' boom. 17' dipper handle, 2-cu. yd. dipper. 3 motor suitable for power supply 3 phase 25 cycle 440 volt. Excellent condition. Located Southern Wisconsin. Box 2750

MARION MODEL 37 steam shovel crawler mounting, 32' boom also 50' crane boom and clamshell bucket. Steel cab, good condition, central location. Box 2836

For Sale

4-YD. ELECTRIC QUARRY SHOVEL
Box 2784

FOR SALE

MARION MODEL 125 electric shovel, crawler mounted, 55' boom, 36' handle, 2½-yard bucket. For power supply 3 phase, 60 cycle, 2300 volts. Box 2854

SHOVEL

6 YD. 200-B Bucyrus-Erie Stripping Shovel.

DRAGLINES

7 **MONIGHAN** 3-W, 4-W, 5-W and 6-W Diesel walkers.
2 43-B and 48-B Diesel Cats.

TIDEWATER EQUIPMENT & MACHY. CORP.
305 Madison Avenue, New York, N. Y.

BUCYRUS-ERIE MODEL 1030. Gasoline. Clamshell. 50 ft. boom, ⅝-yard Owen Digging Bucket. Also Dragshovel equipment. Good operating condition. Working every day. Located Detroit. Box 2768

CLASS 14 Steam Dragline No. 3562 with 70' boom and 2-yard Page dragline bucket said to be in good running condition, immediately available, centrally located. Box 2847

BUCYRUS-ERIE 55-B Diesel Dragline. 75'-0" Boom. Oversize Cats. Atlas engine. Now operating Kansas. Box 2766

BUCYRUS-MONIGHAN 3-W Diesel Dragline. 100 ft. Boom. One 2¼-yd. AX Drag Bucket and one 3-yd. AUX Drag Bucket. Operated less than twelve months total time. Located South Dakota. Box 2767

TRACTORS, SCRAPERS, DOZERS, GRADERS, ETC.

INTERNATIONAL TD-9 Crawler tractor with Bucyrus-Erie Bulldozer, used four months, good as new. C. H. Last Crane Service Company, 1306 East Market Street, Indianapolis, Indiana.

6 DIESEL and gas Caterpillars; 10 shovels, ½ to 8 yd., gas, steam; radial drills; drill press; boring bar; 16" grinder; electric, gas, diesel motors. A. Besse, Pittsburg, Kansas.

MODEL M-81 Bucyrus-Erie four wheel scraper, excellent shape, used less than five months. Price, including winch, $2000.00. Dow & Company, Buffalo, New York.

MISCELLANEOUS EQUIPMENT

2 YD. SLACKLINE outfit complete, in excellent condition. Consisting of 100 H.P.G.E. variable speed hoist motor, two speed hoist, 80' all steel mast, one two yard bucket, one 1¼ yd. bucket.

R. W. Robinson
P. O. Box 603 Austin, Texas

TRAILER BARGAIN
NEW 17 TON WILLIAMS FOUR WHEEL PLATFORM TRAILERS, SOLID RUBBER TIRES
EXCELLENT CONDITION
PRICED LOW FOR QUICK SALE
THE WELLMAN ENGINEERING COMPANY
CLEVELAND, OHIO

FOR SALE OR RENT

6 **ATHEY** 16 cu. yd. Model FB32 2-way dump trailers on 30 ton tracks; 2 Model D-8 Caterpillar tractors. Michael Pontarelli & Sons, 4248 N. Kilpatrick Avenue, Chicago, Ill.

FOR SALE

1 P&H 700B shovel attachment with 1¼ cu. yd. manganese front bucket. Good condition.
1 Williams General Purpose clamshell bucket, 1 yd. capacity complete with teeth.
1 Unit No. 15 dragline shovel attachment for 10-B Bucyrus-Erie machine. New.
1 Unit No. 3 clamshell attachment with 28' boom for Bucyrus-Erie 10-B shovel. New.
1 P&H 300B trench hoe attachment. Good condition.
1 Warrington Vulcan No. 1 pile hammer with standard base, steel ram.
1 LaCrosse KU6-18 Ton pneumatic tired trailer. 8'x14' platform. Used only 6 times. Box 2856

FOR TRADE

HEAVY DUTY 1½-yard clam bucket now working, for 1½-yard orange peel bucket in good condition. Central Coal Company, Madison, Indiana.

ONE No. 6 Champion crusher, manganese Jaws. Capacity at least 50 tons per hour. Used very little. Owner has no further use for it. Priced to sell immediately.

E. E. AUSTIN AND SON
20th and Reed Sts. Erie, Pa.

INDUSTRIAL-BROWNHOIST. 40' boom Clamshell including 1¼-yd. Owen bucket. Buda Gas engine. Ready for a season of hard work. Located Central Illinois. Box 2751

STRUCTURAL STEEL—STIFF LEG DERRICK. Boom approximately 50'. Swings 360 degrees. Four part line on boom. Three part hoist line. Manually operated machinery on base of mast. Estimated capacity ten to fifteen tons. Located Pennsylvania. Box 2748

Heavy, medium, light metal welding outfits $32.70-$76.06. Cutting outfits $49.47 up. Welding supplies, accessories. Elec. Arc Welders. Acetylene Generators. Superior Oxy-Acetylene Machine Co., Dept. J, Hamilton, Ohio.

Car Transporter

STACKER TYPE MACHINE consisting of self-propelled caterpillar mounted, inclined bridge on which 3-cubic yard material transporting car travels and dumps automatically at a distance approximately 145' horizontally and 80' vertically from loading point. Machine in good condition and priced to sell. Operates on 60-cycle, 3-phase, 2300 volts. Further information on request.
Box 2772

BOILER at slashed price. Locomotive type, 75 h.p. under forced draft, 40 h.p. natural draft, 44"x17' 125 lb. working pressure A.S.M.E. Std. Will fit 68-C shovel. Surplus stock. Good as new. Why pay more if this bargain will make money for you? Offered subject to prior sale.
Write—Wire—Telephone
BUCYRUS-ERIE COMPANY
PARTS DEPARTMENT
SOUTH MILWAUKEE, WIS.

FOR SALE—REBUILT EQUIPMENT

TRACTOR - SCRAPER — Allis - Chalmers, Model L. O. Diesel tractor, Gar Wood 8 yard Hydraulic Scraper—$3750.00.

BLADE GRADERS—Caterpillar No. 66, 12' blade, Hand Control—$1000.00. Austin-Western No. 11, 12' blade, Hydraulic Control—$1250.00. Galion No. 210, 10' blade, Hand Control—$900.00.

MOTOR GRADERS—Austin-Western, Model 77 Sr. Tandem drive, Diesel powered, 12' blade—$3500.00. Austin-Western Model 66, Gas powered, Tandem drive, 12' blade—$2500.00.

CRUSHER—1016 Austin Western, on steel wheels 22' folding elevator and screen. Without Screen—$1500.00. With Screen—New—$2200.00.

POWER UNITS—Wisconsin Model K, 6x7, 80 h.p. with radiator, housing, clutch and pulley—$700.00. 2—Wisconsin Model B3, 5½x6½, 65 h.p. with radiator, housing, clutch and pulley—$650.00 each. Climax, RI, 6 cylinder, 6x7, 150 h.p. Burns tractor fuel, radiator, housing, clutch and pulley — $1250.00.

SHOVEL ATTACHMENTS—For Northwest Model 104 - 105 and 2.

Send for our complete list

NIXON-HASSELLE COMPANY, INC.
1300 Carter Street
Chattanooga, Tennessee

Engine

For Sale at Bargain Price

1 Used "Waukesha-Hesselman," Oil engine, Serial No. 371416 Model XBKH, 4-cylinder, 3¾"x4¾", 20 H.P. at 900 RPM (run only 100 hours for test machine), at South Milwaukee, Wis.

Write — Wire — Telephone

BUCYRUS-ERIE COMPANY
PARTS DEPARTMENT
SOUTH MILWAUKEE, WIS.

LORAIN 75-A boom and 1¼ yard dipper. In good condition. $2,000. Located Missouri. Box 2828

FOR SALE

1 Gardner Denver single stage compressor, powered by Buda Engine, 220' displacement. $500.
1 Ingersoll-Rand compressor, 105 cu. ft. mounted on 4 pneumatic tired wheels, latest air flow model—6 weeks old. $1775.
1 Sullivan Compressor Model WJ3-Angle Compound-belt type-2 stage 468 CFM-Displacement. $1350.
1 ¾-yard Northwest crane No. 3, gasoline engine, 40' Lattice Type Boom—¾-yard Williams Clam Bucket. $4500.
1 Traylor Reduction Crusher, Model TY, Size 1'x8"—A-1 condition—ready to operate. $1800.
1 24x16 New Holland Roll Crusher. Like new. $875.
1 10x30 Wheeling Crusher, roller bearing jaw type. A-1 condition. $1675.
1 10x40 Good Roads Crusher, roller bearings jaw type—overhead eccentric—Completely rebuilt. $2850.
1 "Caterpillar" Diesel D8800 Power Unit, 4 cylinder, 80 HP, extended shaft and outboard bearing. $1875.
1 "Caterpillar" D17000 Diesel 8 Cyl. Power Unit—160 HP at 850 RPM. $4500.
1 Fairbanks-Morse Diesel Engine, 560 HP at 257 RPM 16" bore 20" stroke—4 cylinder with magnetic clutch and compressor for starting. Price on application.
1 Koehler Gas-Electric Generator Set 5KVA 120-240 volts single phase, powered by 4-cylinder gasoline engine complete with 32V starting arrangement. $500.
1 Huber 10-ton, 3-wheel roller, powered by 4 cylinder gasoline engine—A-1 condition. $2350.
1 10-ton Buffalo-Springfield 3-wheel roller, latest type, powered by 6 cylinder engine. Almost like new only slightly used. $3750.
1 5-ton Galion, 3 wheel roller, powered by McCormick-Deering engine. $1250.
1 LeTourneau Model U-9 Scraper in A-1 condition—7.7 struck capacity; 10 yd. heaped capacity. $2975.
1 LeTourneau Model G6 Scraper—struck capacity 6.1—heaped capacity 6.5. $1735.
1 LeTourneau Model LS Scraper 8.2 yd. struck capacity—11 yd. heaped capacity—PCU not included. $3600.
1 New Holland Vibrating Screen—Size 3'x8'—2 deck—used only 30 days. $800.
1 Bucyrus-Erie Model 10-B shovel ¾-yd. bucket—crawler type—combination shovel and crane booms—good condition. $3750.
1 Hanson ¾-yd. Model 30 combination shovel and crane—30' crane boom and tagline—factory rebuilt in 1941. $4000.
1 "Caterpillar" RD8 tractor—completely rebuilt—with LeTourneau double drum power control unit and LeTourneau Model JR12 Scraper. $10,000.
2 Vulcan No. 1 Steam Pile Hammers—A-1 condition. Price on application.
1 Link Belt Model K55 Crane, powered by Climax 6 cylinder gasoline engine 75' boom in 30'-25' and 2-10' sections. $9000.
1 Austin-Western Vibrating Screen—2 deck—3'x8'—A-1 condition. $600.

The above is only a partial list of the used equipment that we have available. Write us at once for our new Red, White and Blue used bargain list just off the press. This list contains 103 items, and all bargains.

ROY C. WHAYNE SUPPLY CO.
8th and Main Sts.
Louisville, Kentucky

SURPLUS MINE EQUIPMENT
BARGAIN PRICES

Write for prices of this equipment. Save money. Located in Minnesota.

1—Motor, 135 H.P. squirrel cage, 1150 r.p.m., 220 v., 3 ph., 60 cy., A. C.; compensator.

3—Rotary converters, 300 Kw., HCC-6-800-1200. Forms P, D, & V, 6 and 8 phase.

1—Switchgear for 3-phase rotary converter, complete, semi-automatic.

3—Transformers, 300 Kw., 66,000 V. Primary, reconnected for 22,000 V. Primary.

1—Ainley placer gold machine, complete. 1-bowl with feed hopper for dragline operation. 40-50 tons per hour.

3—Pumps, steam (1 gas engine driven) from 49 to 3700 g.p.m.
Box 2752

FOR SALE

1 27E Rex paver, 1 8 ton roller, 1 Gardner Denver air compressor, 1 Cletrac 55 tractor bulldozer, 1 Gar-Wood & 1 Issacson bulldozer attachments. Sols, 95 Flat Shoals Ave., Atlanta, Georgia.

FOR SALE—75' boom, 52' handle, 3 yard dipper steam stripping shovel mounted on 4 wheel equalized trucks reasonably priced central location. Box 2840

27'6" boom, 18' dipper handle, 2¼ yd. rock type dipper. Also auxiliaries for 52-B diesel shovel service. Used less than 6 months. **Box 2839**

Need a Dragline Bucket?

Here are two new and four used Dragline buckets—offered at bargain prices.

ONE ⅝-AX Beco Rebuilt, 1,600 lbs.
TWO 2 yd. Beco AU, 3,300 lbs. New.
ONE 3½ yd. Beco AU-AX 6,400 lbs. Used.
ONE 4 yd. Beco Y. 11,500 lbs. Used.
ONE 5 yd. heavy duty Monighan 10,000 lbs. Used.
ONE 7 yd. Monighan W. 13,700 lbs. New.

Money savers for you. New and rebuilt equipment carries new machine guarantee.

Write — Wire — Telephone

BUCYRUS-ERIE COMPANY
PARTS DEPARTMENT
SOUTH MILWAUKEE, WIS.

WANTED

WANTED TO BUY—15 or 20 ton pneumatic tire platform goosenecK trailer.
E. E. AUSTIN AND SON
20th and Reed Sts. Erie, Pa.

WANTED: Used back-hoe for either Lima 101 shovel or Lorain 75-B. **Box 2852**

WANTED: Used 1½ or 2-yard gas shovel for stripping. **Box 2849**

WANTED: One 50 or 60 h.p. Diesel tractor with Bulldozer; or trade one Monighan gasoline dragline with 45-foot boom for same. **Box 2848**

WANTED: One used ½-yard truck dragline with 24 to 36-foot boom including distributor frame to be mounted on a Thornton Tandem Drive Ford. **Box 2851**

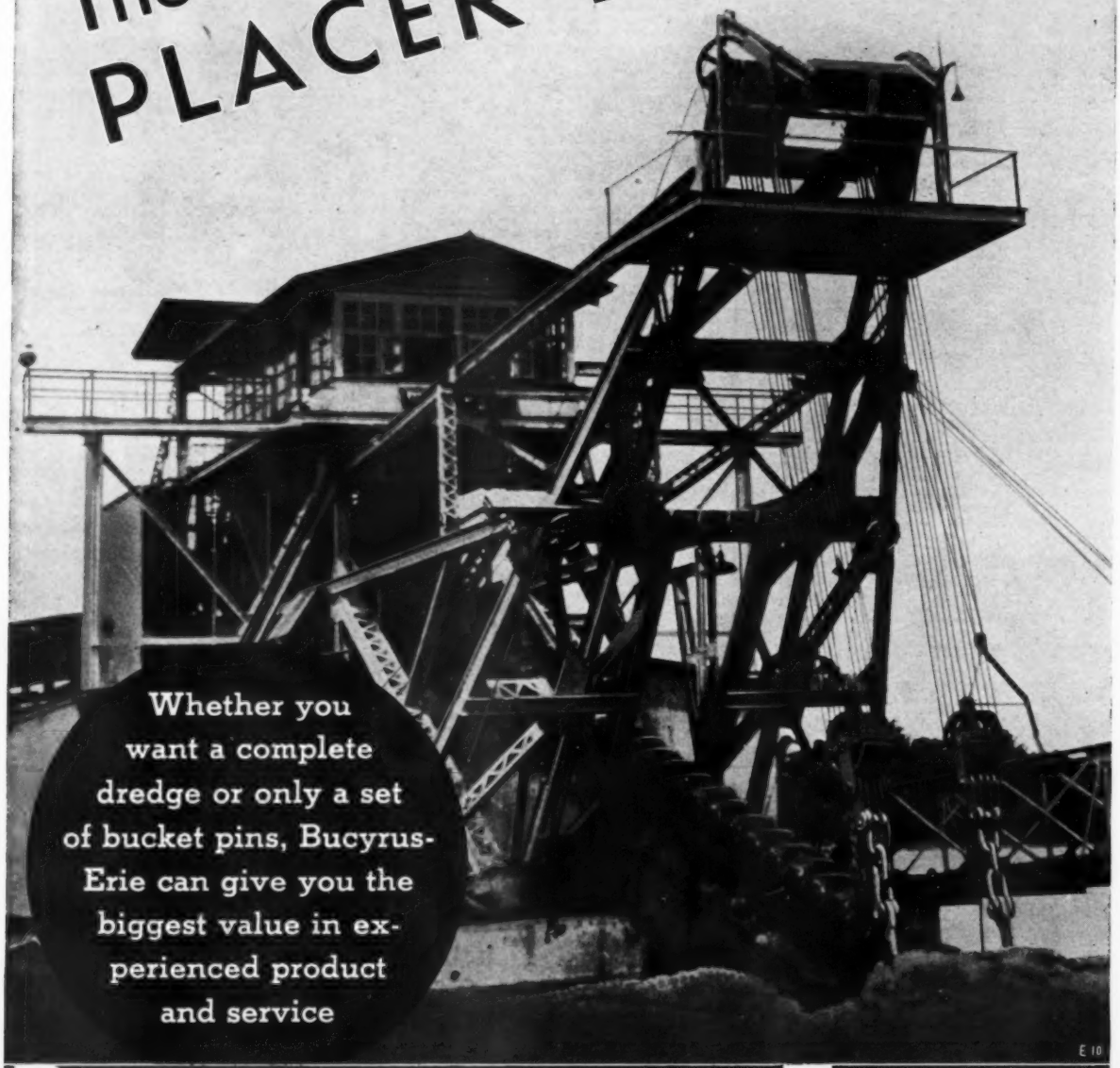
WANTED: ¾-yard back-hoe attachment for 19-B shovel. Wire condition, price and location. **Box 2850**

WANTED: Used pull shovel attachment for Koehring 301. Give full particulars. Willy Boutin, 4233 Bannantyne Ave., Verdun, P. Q., Canada.

WANTED—Used Cleveland Trencher "Baby digger" or will trade 7 foot Barber-Greene for 8 foot ditching machine. **Box 2855**

WANTED—1-yd. crane, 1¼ and 2½-yd. shovels, large primary and secondary crushers, screens, conveyors, bins, locomotive, cars, etc. for quarry and crushing plant. **Box 2853**

The world's largest builder of PLACER DREDGES



Whether you want a complete dredge or only a set of bucket pins, Bucyrus-Erie can give you the biggest value in experienced product and service

E 10

Bucyrus·Erie

SOUTH MILWAUKEE, WISCONSIN

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.